

CRPL-F57

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## IONOSPHERIC DATA

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PREPARED BY CENTRAL RADIO PROPAGATION LABORATORY  
National Bureau of Standards  
Washington, D.C.



IONOSPHERIC DATA

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## SYMBOLS AND TERMINOLOGY; CONVENTIONS FOR DETERMINING MEDIAN VALUES

Beginning with data reported for January 1949, the symbols, terminology, and conventions for the determination of median values used in this report (CRPL-F series) conform as far as practicable to those adopted at the Fifth Meeting of the International Radio Consultative Committee (C.C.I.R.) in Stockholm, 1948, and given in detail on pages 2 to 10 of the report CRPL-F53, "Ionospheric Data," issued January 1949.

For symbols and terminology used with data prior to January 1949, see report IRPL-C61, "Report of International Radio Propagation Conference, Washington, 17 April to 5 May, 1944," previous issues of the F series, in particular, IRPL-F5, CRPL-F24, F33, F50, and report CRPL-7-1, "Preliminary Instructions for Obtaining and Reducing Manual Ionospheric Records."

Following the recommendations of the Washington (1944) and Stockholm (1948) conferences, beginning with data for January 1945, median values are published wherever possible. Where averages are reported, they are, at any hour, the average for all the days during the month for which numerical data exist.

In addition to the conventions for the determination of medians given in Appendix 5 of Document No. 293 E of the Stockholm conference, which are listed on pages 9 and 10 of CRPL-F53, the following conventions are used in determining the medians for hours when no measured values are given because of equipment limitations and ionospheric irregularities. Symbols used are those given on pages 2-9 of CRPL-F53 (Appendixes 1-4 of Document No. 293 E referred to above).

a. For all ionospheric characteristics:

Values missing because of A, B, C, F, L, M, N, Q, R, S, or T (see terminology referred to above) are omitted from the median count.

b. For critical frequencies and virtual heights:

Values of foF2 (and foE near sunrise and sunset) missing because of E are counted as equal to or less than the lower limit of the recorder. Values of h'F2 (and h'E near sunrise and sunset) missing for this reason are counted as equal to or greater than the median. Other characteristics missing because of E are omitted from the median count. See CRPL-F38, page 9.

Values missing because of D are counted as equal to or greater than the upper limit of the recorder.

Values missing because of G are counted:

1. For  $f_oF_2$ , as equal to or less than  $f_oF_1$ .
2. For  $h'F_2$ , as equal to or greater than the median.

Values missing because of W are counted:

1. For  $f_oF_2$ , as equal to or less than the median.
2. For  $h'F_2$ , as equal to or greater than the median.

Values missing for any other reason are omitted from the median count.

c. For MUF factors (K-factors):

Values missing because of G or W are counted as equal to or less than the median.

Values missing for any other reason are omitted from the median count.

d. For sporadic E (Es):

Values of  $fEs$  missing because of G (no Es reflections observed, the equipment functioning normally otherwise) are counted as equal to or less than the median  $f_oE$ , or equal to or less than the lower frequency count of the recorder.

Values of  $fEs$  missing for any other reason, and values of  $h'Es$  missing for any reason at all are omitted from the median count.

Beginning with data for November 1945, doubtful monthly median values for ionospheric observations at Washington, D. C., are indicated by parentheses, in accordance with the practice already in use for doubtful hourly values. The following are the conventions used to determine whether or not a median value is doubtful:

1. If only four values or less are available, the data are considered insufficient and no median value is computed.

2. For the  $F_2$  layer, if only five to nine values are available, the median is considered doubtful. The E and  $F_1$  layers are so regular in their characteristics that, as long as there are at least five values, the median is not considered doubtful.

3. For all layers, if more than half of the values used to compute the median are doubtful (either doubtful or interpolated), the median is considered doubtful.

The same conventions are used by the CRPL in computing the medians from tabulations of daily and hourly data for stations other than Washington, beginning with the tables in IRPL-F18.

## MONTHLY AVERAGE AND MEDIAN VALUES OF WORLD-WIDE IONOSPHERIC DATA

The ionospheric data given here in tables 1 to 31 and figures 1 to 61 were assembled by the Central Radio Propagation Laboratory for analysis and correlation, incidental to CRPL predictions of radio propagation conditions. The data are median values unless otherwise indicated. The following are the sources of the data in this issue:

British Department of Scientific and Industrial Research,

Radio Research Board:

Falkland Is.

Fraserburgh, Scotland

Lindau/Harz, Germany

Slough, England

National Laboratory of Radio-Electricity (French Ionospheric Bureau):

Bagneux, France

Poitiers, France

All India Radio (Government of India), New Delhi, India:

Bombay, India

Delhi, India

Madras, India

Indian Council of Scientific and Industrial Research,

Radio Research Committee:

Calcutta, India

South African Council for Scientific and Industrial Research:

Capetown, Union of S. Africa

Johannesburg, Union of S. Africa

United States Army Signal Corps:

Okinawa I.

National Bureau of Standards (Central Radio Propagation Laboratory):

Baton Rouge, Louisiana (Louisiana State University)

Boston, Massachusetts (Harvard University)

Huancayo, Peru (Instituto Geofisico de Huancayo)

Maui, Hawaii

Palmyra I.

San Francisco, California (Stanford University)

San Juan, Puerto Rico (University of Puerto Rico)

Trinidad, British West Indies

Washington, D. C.

White Sands, New Mexico

Wuchang, China (National Wuhan University)

The tables and graphs of ionospheric data are correct for the values reported to the CRPL, but, because of variations in practice in the interpretation of records and scaling and manner of reporting of values, may at times give an erroneous conception of typical ionospheric characteristics at the station. Some of the errors are due to:

- a. Differences in scaling records when spread echoes are present.
- b. Omission of values when  $f_oF_2$  is less than or equal to  $f_oF_1$ , leading to erroneously high values of monthly averages or median values.
- c. Omission of values when critical frequencies are less than the lower frequency limit of the recorder, also leading to erroneously high values of monthly average or median values.

These effects were discussed on pages 6 and 7 of the previous F-series report IRPL-F5.

Ordinarily a blank space in the fEs column of a table is the result of the fact that a majority of the readings for the month are below the lower limit of the recorder. Blank spaces at the beginning and end of columns of h'F<sub>1</sub>, f<sub>o</sub>F<sub>1</sub>, h'E, and f<sub>o</sub>E are usually the result of diurnal variation in these characteristics. Complete absence of medians of h'F<sub>1</sub> and f<sub>o</sub>F<sub>1</sub> is usually the result of seasonal effects.

The dashed-line prediction curves of the graphs of ionospheric data are obtained from the predicted zero-muf contour charts of the CRPL-D series publications. The following points are worthy of note:

- a. Predictions for individual stations used to construct the charts may be more accurate than the values read from the charts since some smoothing of the contours is necessary to allow for the longitude effect within a zone. Thus, inasmuch as the predicted contours are for the center of each zone, part of the discrepancy between the predicted and observed values as given in the F series may be caused by the fact that the station is not centrally located within the zone.
- b. The final presentation of the predictions is dependent upon the latest available ionospheric and radio propagation data, as well as upon predicted sunspot number.
- c. There is no indication on the graphs of the relative reliability of the data; it is necessary to consult the tables for such information.

The following predicted smoothed 12-month running-average Zürich sunspot numbers were used in constructing the contour charts:

Month	Predicted Sunspot No.				
	1949	1948	1947	1946	1945
December		114	126	85	38
November		115	124	83	36
October		116	119	81	23
September		117	121	79	22
August		123	122	77	20
July		125	116	73	
June		129	112	67	
May		130	109	67	
April	109	133	107	62	
March	111	133	105	51	
February	113	133	90	46	
January	112	130	88	42	

## IONOSPHERIC DATA FOR EVERY DAY AND HOUR AT WASHINGTON, D. C.

The data given in tables 32 to 43 follow the scaling practices given in the report IRPL-C61, "Report of International Radio Propagation Conference," pages 36 to 39, and the median values are determined by the conventions given above under "Symbols and Terminology; Conventions for Determining Median Values."

## IONOSPHERE DISTURBANCES

Table 44 presents ionosphere character figures for Washington, D. C., during April 1949, as determined by the criteria presented in the report IRPL-R5, "Criteria for Ionospheric Storminess," together with Cheltenham, Maryland, geomagnetic K-figures, which are usually covariant with them.

Table 45 lists for the stations whose locations are given the sudden ionosphere disturbances observed on the continuous field intensity recordings made at the Sterling Radio Propagation Laboratory during April 1949.

Table 46 lists for the stations whose locations are given the sudden ionosphere disturbances observed at the Brentwood and Somerton, England, receiving stations of Cable and Wireless, Ltd., for March and April, 1949.

Table 47 lists for the stations whose locations are given the sudden ionosphere disturbances reported by the Chinese Government Radio Administration as observed at Shanghai, China, during January, February, and March 1949.

Table 48 lists for the stations whose locations are given the sudden ionosphere disturbances observed at the Point Reyes, California, receiving station of RCA Communications, Inc., for April 6, 10, 11, and 28, 1949.

Table 49 gives provisional radio propagation quality figures for the North Atlantic and North Pacific areas, for 01 to 12 and 13 to 24 GCT, March 1949, compared with the CRPL daily radio disturbance warnings, which are primarily for the North Atlantic paths, the CRPL weekly radio propagation forecasts of probable disturbed periods, and the half-day Cheltenham, Maryland, geomagnetic K-figures.

The radio propagation quality figures are prepared from radio traffic and ionospheric data reported to the CRPL, in a manner basically the same as that described in IRPL-R31, "North Atlantic Radio Propagation Disturbances, October 1943 through October 1945," issued February 1, 1946. The scale conversions for each report are revised for use with the data beginning January 1948, and statistical weighting replaces what was, in effect, subjective weighting. Separate master distribution curves of the type described in IRPL-R31 were derived for the part of 1946 covered by each report; data received only since 1946 are compared with the master curve for the period of the available data. A report whose distribution is the same as the master is thereby converted linearly to the Q-figure scale. Each report is given a statistical weight which is the reciprocal of the departure from linearity. The half-daily radio propagation quality figure, beginning January 1948, is the weighted mean of the reports received for that period.

These radio propagation quality figures give a consensus of opinion of actual radio propagation conditions as reported by the half day over the two general areas. It should be borne in mind, however, that though the quality may be disturbed according to the CRPL scale, the cause of the disturbance is not necessarily known. There are many variables that must be considered. In addition to ionospheric storminess itself as the cause, conditions may be reported as disturbed because of seasonal characteristics such as are particularly evident in the pronounced day and night contrast over North Pacific paths during the winter months, or because of improper frequency usage for the path and time of day in question. Insofar as possible, frequency usage is included in rating the reports. Where the actual frequency is not shown in the report to the CRPL, it has been assumed that the report is made on the use of optimum working frequencies for the path and time of day in question. Since there is a possibility that all the disturbance shown by the quality figures is not due to ionospheric storminess alone, care should be taken in using the quality figures in research correlations with solar, auroral, geomagnetic, or other data. Nevertheless, these quality figures do reflect a consensus of opinion of actual radio propagation conditions as found on any one half day in either of the two general areas.

## SOLAR CORONAL INTENSITIES OBSERVED AT CLIMAX, COLORADO

In tables 50a and 50b are listed the intensities of green (5303A) line of the emission spectrum of the solar corona as observed during April 1949 by the High Altitude Observatory of Harvard University and the University of Colorado at Climax, Colorado, for east and west limbs, respectively, at 5-degree intervals of position angle north and south of the solar equator at the limb. Beginning January 11, 1949, the actual measurements are on solar rotation coordinates rather than astronomical coordinates; thus values of the correction P given in previous coronal tables are omitted. The time of observation is given to the nearest tenth of a day, GCT. The tables of coronal observations in CRPL-F29 to F41 listed the data on astronomical coordinates; the present format on solar rotation coordinates is in conformity with the tables of CRPL-1-4, "Observations of the Solar Corona at Climax, 1944-46."

Tables 51a and 51b give similarly the intensities of the first red (6374A) coronal line; tables 52a and 52b list the intensities of the second red (6704A) coronal line. The following symbols are used in tables 50, 51, and 52: a, observation of low weight; -, corona not visible; and x, position angle not included in plate estimates.

## AMERICAN AND ZÜRICH PROVISIONAL RELATIVE SUNSPOT NUMBERS

Table 53 presents the daily American relative sunspot number,  $R_A$ , computed from observations communicated to CRPL by observers in America and abroad. Beginning with the observations for January 1948, a new method of reduction of observations is employed such that each observer is assigned a scale-determining "observatory coefficient," ultimately referred to Zürich observations in a standard period, December 1944 to September 1945, and a statistical weight, the reciprocal of the variance of the observatory coefficient. The daily numbers listed in the table are the weighted means of all observations received for each day. Details of the procedure are given in the Publication of the Astronomical Society of the Pacific, issued February 1949, in an article entitled "Reduction of Sunspot-Number Observations." The American relative sunspot number computed in this way is designated  $R_A$ . It is noted that a number of observatories abroad, including the Zürich observatory, are included in  $R_A$ . The scale of  $R_A$  was referred specifically to that of the Zürich relative sunspot numbers in the standard comparison period; since that time,  $R_A$  is influenced by the Zürich observations only in that Zürich proves to be a consistent observer and receives a high statistical weight. In addition, this table lists the daily provisional Zürich sunspot numbers,  $R_Z$ .

## TABLES OF IONOSPHERIC DATA

Table 1

Washington, D. C. (39.0°N, 77.5°W)

April 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	280	7.1						2.6
01	280	6.9						2.7
02	280	6.6						2.6
03	270	6.3						2.6
04	270	5.7						2.7
05	280	5.6						2.7
06	260	6.7			120	2.0		3.0
07	240	8.3			100	2.6	3.6	3.0
08	230	9.2	220	---	100	3.1	3.7	3.0
09	250	9.6	220	4.7	100	3.4	3.8	2.9
10	255	10.2	200	5.6	100	3.6	3.7	2.8
11	280	10.6	200	5.2	100	3.7	3.4	2.8
12	325	10.6	210	6.0	100	3.8	3.6	2.8
13	290	10.6	220	5.6	100	3.9		2.7
14	270	10.6	215	5.8	100	3.8	3.2	2.8
15	230	10.5	230	---	100	3.6		2.7
16	230	10.3	225	---	100	3.3		2.8
17	240	10.0	---	---	100	2.9		2.8
18	250	(9.7)			110	2.2	2.0	(2.9)
19	245	(9.4)			---	---	1.9	(2.9)
20	245	8.6						2.8
21	250	8.0						2.7
22	270	7.8						2.7
23	280	7.4						2.6

Time: 75.0°W.  
Sweep: 1.0 Mc to 25.0 Mc in 15 seconds.

Table 2

Boston, Massachusetts (42.4°N, 71.2°W)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	275	6.9						2.6
01	265	6.6						2.6
02	268	5.6						2.6
03	260	5.4						2.6
04	255	5.2			---	---		2.6
05	265	5.0			135	1.8		2.7
06	250	6.7			140	2.0		2.9
07	248	9.0	---	---	140	2.2		3.0
08	250	10.0			---	---		3.0
09	255	10.8	---	---	---	---		3.0
10	260	10.4	---	---	---	---		3.0
11	285	11.1	---	---	---	---		2.9
12	308	10.8	---	---	---	---		3.0
13	318	10.8			---	---		2.9
14	282	10.8	---	---	---	---		2.9
15	265	10.8	---	---	---	---		2.9
16	250	10.7			145	3.0		2.9
17	250	10.2			150	2.2		2.9
18	240	10.3			---	---		2.9
19	245	9.8			---	---		2.8
20	250	9.0						2.8
21	255	8.4						2.7
22	265	7.6						2.7
23	265	7.4						2.7

Time: 75.0°W.  
Sweep: 0.8 Mc to 14.0 Mc in 1 minute.

Table 3

San Francisco, California (37.4°N, 122.2°W)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	260	6.0						2.4
01	280	5.9						2.4
02	300	5.8						2.4
03	280	5.4						2.4
04	280	5.5						2.4
05	300	5.4						2.4
06	270	6.0						2.5
07	240	8.1			120	2.4		2.9
08	230	10.0			120	3.1		2.9
09	220	10.8	---	---	110	3.4		2.8
10	220	12.0	220	---	110	3.6		2.7
11	220	12.6	210	---	110	3.8		2.7
12	220	13.2	210	---	110	3.9		2.6
13	220	13.0	215	---	110	3.9		2.6
14	220	13.2	215	---	110	3.8		2.6
15	220	12.6	---	---	110	3.6		2.6
16	240	12.5			120	3.3		2.6
17	240	12.2			120	2.7		2.7
18	235	11.5			130	2.2		2.7
19	220	10.0						2.8
20	220	8.6						2.8
21	240	7.3						2.7
22	240	6.6						2.6
23	260	6.3						2.6

Time: 120.0°W.  
Sweep: 1.3 Mc to 18.0 Mc in 4 minutes 30 seconds.

Table 4

White Sands, New Mexico (32.3°N, 106.5°W)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	280	8.6			---	---		2.6
01	280	6.6						2.6
02	280	6.4						2.6
03	260	6.1						2.6
04	280	5.6			---	---		2.5
05	290	5.5			---	---		2.5
06	280	6.0			---	---	2.3	2.6
07	240	(9.2)			120	2.4	3.3	(3.0)
08	240	11.1			110	3.0	3.8	3.0
09	230	12.1			110	3.4	4.3	2.9
10	230	12.6	---	---	110	3.7	4.3	2.8
11	220	13.2	---	---	110	3.8	4.4	2.7
12	230	13.4	---	---	110	3.9		2.7
13	220	13.4	---	---	110	4.0		2.7
14	230	13.3	---	---	110	3.9		2.6
15	230	13.2			110	3.7	4.4	2.7
16	240	12.9			110	3.3	4.2	2.7
17	240	12.3			120	2.7	3.6	2.7
18	240	11.9			120	1.8	2.7	2.8
19	230	10.6			---	---	2.4	2.7
20	230	9.2					2.3	2.7
21	250	(7.8)					2.3	(2.7)
22	260	7.1						2.8
23	280	6.9						2.6

Time: 105.0°W.  
Sweep: 0.8 Mc to 14.0 Mc in 2 minutes.

Table 5

Kung, China (27.6°N, 114.4°E)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	250	10.4						2.9
01	240	10.2						3.0
02	235	8.1						3.0
03	225	7.8						3.0
04	230	8.4						2.8
05	250	5.8						2.7
06	260	6.0						2.7
07	240	8.5			115	2.0		3.1
08	225	11.4			100	2.8		3.2
09	220	13.0			100	3.3		3.1
10	225	13.5	210		100	3.6		3.0
11	235	14.2	215	6.3	100	3.8	4.1	2.8
12	240	14.8	210	5.7	100	3.9		2.9
13	240	15.4	200	5.5	100	3.9		2.8
14	290	15.0	220	7.2	100	3.8		2.8
15	300	15.0	220	7.1	100	3.6		2.8
16	238	14.8	215	6.5	100	3.3		2.8
17	230	14.5			100	3.0		2.8
18	232	14.0			100	2.2		2.9
19	235	13.4					2.2	2.9
20	240	12.4						2.9
21	235	12.0					2.0	2.9
22	240	12.0						2.9
23	242	11.4						2.9

Time: 120.0°E.

Sweep: 1.2 Mc to 19.0 Mc in 15 minutes, manual operation.

Table 6

Baton Rouge, Louisiana (30.5°N, 91.2°W)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	290	7.0						2.8
01	290	7.0						2.8
02	290	5.6						2.8
03	290	6.4						2.8
04	290	6.1						2.8
05	295	5.7						2.7
06	290	6.4						2.8
07	280	9.4			150	2.5		3.1
08	280	11.4	230		120	3.0		3.0
09	290	12.1	230		120	3.5		3.0
10	300	13.2	225		120	3.6		2.9
11	310	13.3	220		120	3.7		2.8
12	310	13.3	225		120	3.8		2.8
13	320	13.5	230		120	3.8		2.8
14	320	13.1	230		120	3.7		2.8
15	320	13.1	230		120	3.6		2.8
16	320	12.6	245		120	3.4		2.8
17	300	12.2	250		125	2.8		2.8
18	260	11.9						2.9
19	240	10.0						2.9
20	260	8.6						2.9
21	280	8.0						2.9
22	280	7.7						2.9
23	290	7.5						2.8

Time: 90.0°W.

Sweep: 2.12 Mc to 15.3 Mc in 8 minutes 30 seconds, automatic operation.

Table 7

Okinawa I. (26.3°N, 127.7°E)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00		13.1						3.0
01		12.8						3.0
02		11.2						3.1
03		8.6						3.1
04		6.8						2.8
05		6.1						2.7
06		6.2						2.8
07		8.1						3.0
08		11.6						3.1
09		13.1						3.1
10		14.1				4.0		3.0
11		14.4				4.4		2.9
12		15.1				4.6		2.8
13		15.8				4.6		2.8
14		16.6				4.4		2.8
15		16.7				4.4		2.7
16		16.4				4.2		2.8
17		15.6					3.6	2.8
18		14.8						2.8
19		15.0						2.8
20		16.6						2.8
21		(16.3)						2.9
22		15.0						2.9
23		14.3						2.9

Time: 135.0°E.

Sweep: 3.2 Mc to 18.0 Mc in 15 minutes, manual operation.

Table 8

Maui, Hawaii (20.8°N, 156.5°W)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	250	10.0						3.0
01	240	8.6						3.1
02	240	7.4						3.0
03	240	5.6						3.0
04	265	4.4						2.8
05	315	4.1						2.6
06	325	4.1						2.7
07	250	7.9						3.0
08	250	10.8	225		110	3.0		3.0
09	250	12.4	230		100	3.4		2.9
10	260	13.6	220	6.1	105	3.8		2.8
11	280	14.7	220		110	4.0		2.7
12	300	15.2	230		110	4.0		2.7
13	320	15.8	230	7.0	100	3.8		2.7
14	330	15.8	220	6.7	100	3.9		2.8
15	310	15.7	230	(6.6)	100	3.6		2.7
16	300	15.4	230	6.5	100	3.4		2.8
17	260	14.6	235		100	3.1		2.7
18	240	14.1			120	2.4	3.3	2.8
19	245	13.8					2.9	2.8
20	250	13.8					3.0	(2.9)
21	250	12.8					2.6	(2.9)
22	240	12.1						(2.9)
23	240	11.4						3.0

Time: 150.0°W.

Sweep: 2.2 Mc to 16.0 Mc in 1 minute; above 16.0 Mc, manual operation.

Table 9

San Juan, Puerto Rico (18.4°N, 66.1°W)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00		10.5						2.8
01		10.0						2.8
02		8.6						2.9
03		7.1						2.8
04		6.0						2.7
05		5.7						2.7
06		5.9						2.7
07	250	8.8		3.3				3.0
08	250	11.1		3.8				2.9
09	250	12.8		---		3.0		2.8
10	280	13.5		---		3.5		2.7
11	285	13.5		---		3.8		2.6
12	300	13.5		---		4.0		2.6
13	320 (13.4)			---		4.1		2.6
14	340	13.5		---		4.1		2.5
15	330	13.0		6.1		4.0		2.5
16	320	13.0		6.0		3.8		2.5
17	290	12.8		(5.5)		3.5	4.6	2.5
18	270	12.5		(4.0)		3.2		2.6
19	280	12.0		3.2		---		2.6
20		11.0						2.6
21		10.6						2.6
22		10.5						2.6
23		10.6						2.6

Time: 60.0°W.

Sweep: 2.8 Mc to 13.0 Mc in 9 minutes, supplemented by manual operation.

Table 10

Trinidad, Brit. West Indies (10.6°N, 61.2°W)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00		250		11.8				3.0
01		240		10.4				3.2
02		230		8.5				3.0
03		240		6.8				2.8
04		250		5.8				2.9
05		270		5.0				2.8
06		270		6.1				2.8
07		250		9.3				3.2
08		240		11.4				3.1
09		250		12.9				3.0
10		260		13.8				2.9
11		250		13.8				2.8
12		260		13.8				2.8
13		260		14.0				2.7
14		270		14.0				2.7
15		270		13.8				2.6
16		270		13.4				2.6
17		260		13.2				2.7
18		270		13.1				2.7
19		280		12.8				2.7
20		280		12.6				2.7
21		270		12.4				2.7
22		280		12.0				2.8
23		280		12.5				2.9

Time: 60.0°W.

Sweep: 1.2 Mc to 18.0 Mc, manual operation.

Table 11

Palmyra I. (5.9°N, 162.1°W)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	250	13.7					3.8	2.9
01	240	(11.4)					3.8	(2.9)
02	250	(10.4)					3.8	(2.7)
03	250	(9.0)					3.5	(2.8)
04	260	(8.6)					3.7	(2.9)
05	250	8.4					3.7	(2.8)
06	250	7.8					3.5	2.8
07	280	9.8			140	---	3.6	2.7
08	250	12.1			130	3.2	4.3	2.6
09	250	13.4	240	---	130	3.7	4.4	2.4
10	270	13.5	240	---	120	3.9	4.2	2.3
11	280	13.1	240	---	120	---	---	2.2
12	270	13.0	(230)	---	120	---	---	2.2
13	280	13.3	240	---	120	---	---	2.2
14	270	13.9	230	---	120	---	---	2.2
15	270	14.3	230	---	120	3.9	4.2	2.2
16	250	14.8	210	3.8	120	3.6	3.8	2.3
17	260	15.2			130	3.1	4.0	2.3
18	290	15.0			140	2.2	3.9	2.3
19	340	14.6					3.0	2.2
20	390	13.8					1.9	2.1
21	340	14.3					2.5	(2.3)
22	290	14.8					3.7	(2.5)
23	250	14.3					3.8	2.8

Time: 157.5°W.

Sweep: 1.0 Mc to 13.0 Mc in 1 minute 36 seconds, automatic operation;  
13.0 Mc to 18.0 Mc, manual operation.

Table 12

Huancayo, Peru (12.0°S, 75.3°W)

March 1949

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	230	9.6						2.7
01	230	9.7						2.8
02	240	8.6					2.9	2.9
03	240	7.9					2.8	3.0
04	230	6.9					2.8	3.0
05	240	5.9					2.8	3.1
06	270	6.4					1.7	3.0
07	250	10.5					2.7	3.0
08	240	13.0					3.5	10.8
09	---	14.2	230	---			3.8	10.8
10	270	14.0	220	5.5			4.0	11.9
11	260	14.2	210	5.4			4.1	11.8
12	260	14.0	210	5.5			4.1	11.3
13	270	13.0	210	5.5			4.1	11.9
14	270	12.8	210	5.4			4.0	11.8
15	---	13.0	210	---			3.8	11.5
16	235	13.0					3.4	10.9
17	260	12.9					2.8	10.6
18	310	12.0					1.7	3.2
19	420	11.2						2.0
20	410	10.4						2.1
21	330	10.2						2.2
22	290	11.0						(2.5)
23	245	10.0						2.7

Time: 75.0°W.

Sweep: 16.0 Mc to 0.5 Mc in 15 minutes, automatic operation.

Table 13

Lindau/Harz, Germany (51.6°N, 10.1°E)

February 1949

Time	h'F2	f <sup>o</sup> F2	h'F1	f <sup>o</sup> F1	h'E	f <sup>o</sup> E	fEs	F2-M3000
00	300	4.8						
01	300	4.7						
02	305	4.4						
03	305	4.1						
04	305	3.8						
05	300	3.3						
06	300	3.3						
07	290	4.3						
08	220	7.8			130	2.0	2.0	
09	215	10.1			105	2.6	2.7	
10	215	11.3			105	2.9	3.3	
11	210	12.5			105	3.2	3.2	
12	215	12.4			105	3.2	3.2	
13	220	12.7			105	3.2	3.2	
14	215	12.0			105	3.2	3.3	
15	220	12.0			105	3.0	3.2	
16	220	12.0			105	2.6	2.6	
17	220	11.3			110	2.0	2.4	
18	215	10.3					2.5	
19	210	8.5					2.0	
20	215	7.1					2.0	
21	250	6.2						
22	290	5.7						
23	300	5.5						

Time: 15.0°E.

Sweep: 1.4 Mc to 16.0 Mc in 7 minutes.

Table 14

Johannesburg, Union of S. Africa (26.2°S, 28.0°E)

February 1949

Time	h'F2	f <sup>o</sup> F2	h'F1	f <sup>o</sup> F1	h'E	f <sup>o</sup> E	fEs	F2-M3000
00	270	7.0						2.8
01	270	6.5					1.5	2.7
02	260	6.0						2.8
03	260	5.3						2.8
04	260	5.0						2.7
05	280	4.7						2.7
06	260	6.1			110	1.9		2.9
07	240	8.4	240	---	110	2.8	3.3	3.0
08	260	9.9	230	4.9	110	3.4	3.7	2.9
09	300	10.7	220	---	110	3.8	4.1	2.7
10	330	11.4	210	6.0	110	4.0	4.3	2.7
11	330	11.7	210	6.0	110	(4.1)		2.8
12	350	12.0	210	6.4	110	(4.1)	4.2	2.6
13	350	12.2	210	6.0	110	---		2.6
14	360	12.1	220	6.2	100	(4.1)		2.8
15	350	12.0	220	5.9	110	(4.0)		2.6
16	330	11.7	220	---	110	3.7		2.7
17	300	11.3	230	---	110	3.3	3.9	2.7
18	260	10.9	240	---	100	2.6	3.5	2.8
19	250	10.5			---	---	3.0	2.8
20	250	9.5					1.8	2.8
21	250	9.0					2.3	2.8
22	250	8.2					1.9	2.8
23	260	7.5						2.8

Time: 30.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 7 seconds.

Table 15

Capetown, Union of S. Africa (34.2°S, 18.3°E)

February 1949

Time	h'F2	f <sup>o</sup> F2	h'F1	f <sup>o</sup> F1	h'E	f <sup>o</sup> E	fEs	F2-M3000
00	(280)	5.8						2.8
01	(290)	5.2					1.9	2.7
02	(290)	5.0						2.7
03	(295)	4.8						2.7
04	(290)	4.8						2.7
05	(310)	4.3						2.6
06	300	4.8						2.7
07	250	7.0	---	---	120	2.3		3.0
08	(280)	8.8	240	---	110	3.0	3.1	2.9
09	(280)	10.1	230	---	110	3.5	3.6	2.8
10	(300)	11.0	230	---	110	---		2.7
11	330	11.2	---	6.0	110	---		2.8
12	350	11.5	---	---	110	---		2.6
13	350	12.0	---	---	110	---		2.6
14	360	12.0	---	(8.5)	110	---		2.6
15	385	11.6	---	6.2	110	---		2.8
16	350	11.1	---	6.0	110	---		2.6
17	330	10.7	230	---	110	3.5		2.7
18	(305)	10.2	240	---	110	3.0		2.7
19	250	10.0	---	---	110	2.2		2.8
20	250	9.5			100	---		2.8
21	240	8.3						2.8
22	(240)	7.4					1.7	2.9
23	(250)	6.4						2.9

Time: 30.0°E.

Sweep: 1.0 Mc to 15.0 Mc in 7 seconds.

Table 16

Delhi, India (28.6°N, 77.1°E)

January 1949

Time	*	f <sup>o</sup> F2	h'F1	f <sup>o</sup> F1	h'E	f <sup>o</sup> E	fEs	F2-M3000
00	480	4.6						2.4
01	480	4.3						
02	(500)	(4.4)						
03	---	---						
04	(460)	3.6						2.4
05	470	2.9						
06	440	3.5						
07	390	7.2						
08	360	10.0						2.7
09	360	11.4						
10	400	11.9						
11	400	13.0						
12	440	12.3						2.3
13	440	13.2						
14	460	13.0						
15	440	13.2						
16	440	13.2						2.5
17	400	13.0						
18	400	11.6						
19	400	10.6						
20	390	9.4						2.6
21	400	8.1						
22	440	6.2						
23	460	5.0						

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83 foF2.

\*\*Average values; other columns, median values.

Table 17

Bombay, India (19.0°N, 73.0°E)

January 1949

Time	*	f <sup>o</sup> F2	h'F1	f <sup>o</sup> F1	h'E	f <sup>o</sup> E	fEs	F2-M3000
00								
01								
02								
03								
04								
05								
06								
07								
08		360	11.9					2.9
09		420	12.9					
10		480	13.8					
11		---	(14.1)					
12		---	(14.3)					2.7
13		---	(14.4)					
14		---	(14.7)					
15		---	14.9					
16		---	(15.0)					
17		---	(15.1)					
18		---	(15.1)					
19		480	(14.9)					
20		480	14.6					2.7
21		450	14.2					
22		420	13.6					2.8
23		(420)	(12.6)					

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83 foF2.

\*\*Average values; other columns, median values.

Table 18

Madras, India (13.0°N, 80.2°E)

January 1949

Time	*	f <sup>o</sup> F2	h'F1	f <sup>o</sup> F1	h'E	f <sup>o</sup> E	fEs	F2-M3000
00								
01								
02								
03								
04								
05								
06								
07		360	9.4					
08		420	10.4					2.9
09		480	11.0					
10		480	11.8					
11		480	12.0					
12		525	12.4					2.5
13		540	12.6					
14		540	12.6					
15		540	12.2					
16		540	12.2					2.6
17		540	12.0					
18		480	11.4					
19		480	(11.2)					
20		(540)	(10.4)					2.6
21		---	(10.0)					
22		---	(10.0)					
23								

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83 foF2.

\*\*Average values; other columns, median values.

Table 19

Delhi, India (28.6°N, 77.1°E)

December 1948

Time	*	f <sup>o</sup> F2	h'F1	f <sup>o</sup> F1	h'E	f <sup>o</sup> E	fEs	F2-M3000
00		480	4.2					2.3
01		260	4.2					
02		480	3.7					
03								
04		470	3.6					2.3
05		(420)	(3.7)					
06		440	4.2					
07		360	7.8					
08		380	10.8					2.8
09		380	11.9					
10		400	13.0					
11		400	13.3					
12		400	(13.4)					2.5
13		430	(13.5)					
14		420	(13.2)					
15		400	(13.4)					
16		400	(13.2)					2.5
17		400	12.6					
18		(380)	11.1					
19		(440)	(9.4)					
20		400	8.6					2.7
21		400	7.2					
22		400	5.4					
23		400	4.7					

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83 foF2.

\*\*Average values; other columns, median values.

Table 20

Bombay, India (19.0°N, 73.0°E)

December 1948

Time	*	f <sup>o</sup> F2	h'F1	f <sup>o</sup> F1	h'E	f <sup>o</sup> E	fEs	F2-M3000
00								
01								
02								
03								
04								
05								
06								
07		330	8.3					
08		380	10.9					2.8
09		420	12.2					
10		480	13.3					
11			(13.8)					
12			(14.0)					
13			(14.3)					
14			(14.4)					
15			(14.6)					
16			(14.8)					
17			(15.0)					
18			(15.0)					
19			(14.9)					
20		480	(14.9)					2.7
21		480	14.3					
22		480	13.6					2.7
23								

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.83 foF2.

\*\*Average values; other columns, median values.

Table 21

Madras, India (13.0°N, 80.2°E)

December 1948

Time	*	f <sup>o</sup> F2	h'F1	f <sup>o</sup> F1	h'E	f <sup>o</sup> E	fEs	F2-M3000
00								
01								
02								
03								
04								
05								
06								
07	360	8.0						
08	420	9.6						2.9
09	480	10.4						
10	480	10.8						
11	480	11.0						
12	510	11.1						2.7
13	540	11.4						
14	540	11.5						
15	540	11.5						
16	540	11.8						2.7
17	540	11.9						
18	540	11.9						
19	540	11.6						
20	525	11.0						2.7
21	480	(10.6)						
22	480	10.4						
23								

Time: Local.

Sweep: 1.8 Mc to 16.0 Mc in 5 minutes, manual operation.

\*Height at 0.85 foF2.

\*\*Average values; other columns, median values.

Table 22

Bagneux, France (48.8°N, 2.3°E)

October 1948

Time	h'F2	f <sup>o</sup> F2	h'F1	f <sup>o</sup> F1	h'E	f <sup>o</sup> E	fEs	F2-M3000
00								
01								
02								
03								
04								
05								
06	300							
07	295		240					
08	290		250					
09			250					
10			250					
11			240					
12			240					
13			250					
14			250					
15			250					
16			240					
17			240					
18	280		240					
19	280		250					
20	315							
21	340							
22	380							
23								

Time: 0.0°.

Sweep: 3.9 Mc to 13.4 Mc in 12 minutes, manual operation.

Table 23

Foitiers, France (46.6°N, 2.0°W)

October 1948

Time	h'F2	f <sup>o</sup> F2	h'F1	f <sup>o</sup> F1	h'E	f <sup>o</sup> E	fEs	F2-M3000
00								
01								
02	330	4.3						
03	328	4.6						2.6
04	305	4.2						2.8
05	280	3.8						2.8
06	278	4.4				E		3.0
07	250	7.3				E		3.1
08	250	9.4	230				3.3	3.2
09	250	10.5	230		110	3.2	3.8	3.1
10	240	(11.4)	222		120	3.2	4.3	(3.1)
11	250	>11.8	220		110	3.4	3.8	(3.1)
12	250	>11.8	220		110	3.4	3.7	
13	250	>11.8	225		110	3.4		
14	255	>11.8	230		125	3.3		
15	250	>11.8	230			3.1		
16	250	>11.8	230			E		
17	240	11.2	232			E		(3.2)
18	230	9.6						3.2
19	235	7.4						3.0
20	252	6.1						2.9
21	280	5.1						2.8
22	308	5.2						2.6
23		4.8						(2.5)

Time: 0.0°.

Sweep: 3.1 Mc to 11.8 Mc in 6 minutes (October 1 through 19);  
in 1 minute 15 seconds (October 20 through 31); automatic operation.

Table 24

Calcutta, India (22.6°N, 88.4°E)

October 1948

Time	h'F2	f <sup>o</sup> F2	h'F1	f <sup>o</sup> F1	h'E	f <sup>o</sup> E	fEs	F2-M3000
00	(300)	(10.7)				2.3		(2.7)
01		(8.8)				2.2		
02		(8.0)				2.2		
03						1.8		
04						1.8		
05								
06	(300)	(7.2)				2.2		(2.8)
07		(7.8)				2.6		
08		(9.8)				3.2		
09	(360)	(10.7)				3.6		(2.8)
10		(11.2)				4.0		
11		11.2				4.0		
12	(390)	11.1				4.0		(2.6)
13		12.2						
14		12.7						
15	(360)	12.2				4.0		(2.6)
16		12.0				4.0		
17		12.6				3.7		
18	(390)	(12.6)				3.6		(2.4)
19		(12.6)				3.4		
20		(12.4)				3.6		
21	(330)	(12.4)				2.8		(2.7)
22		(11.2)				3.0		
23		(11.0)				2.4		

Time: Local.

\*Probably includes fEs observations.

Table 25\*

Fraserburgh, Scotland (57.6°N, 2.1°W)

September 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	340							
01	340							
02	340							
03	355	5.3						
04	345	5.3						
05	300	5.3						
06	270	5.4						2.7
07	350	6.4	250	3.8	125	2.6		3.0
08	280	6.9	245	4.3	125	3.0		3.0
09	265	7.5	225	4.6	120	2.2		2.8
10	280	7.5	230	4.7	125	3.5		2.8
11	280	7.9	215	5.0	120	3.6		2.8
12	275	8.5	225	4.9	120	3.7		2.7
13	290	8.4			120	3.7		2.7
14	265	8.5	230	4.8	120	3.6		2.8
15	265	8.7	255	4.7	120	3.4		2.7
16	265	9.2	235	4.4	125	3.1		2.7
17	260	9.0	250#	4.0#	125	2.7		2.9
18	250	(9.0)			110#	2.8#		3.0
19	255	(8.3)						2.9
20	255	8.1						2.8
21	265	(7.0)						
22	285	(5.2)						
23	320	4.8						

Time: Local.

Sweep: 2.2 Mc to 16.0 Mc in 1 minute.

\*Average values except for f°F2, which are median values.

#One or two observations only.

Table 26\*

Slough, England (51.5°N, 0.6°W)

September 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00		5.8					3.2	2.5
01		5.5					3.1	2.5
02		5.8					2.6	2.5
03		4.6					2.9	2.5
04		4.4					3.0	2.5
05	388	4.2					3.2	2.7
06	275	5.5	279	3.6	127	1.8	3.7	2.9
07	273	6.9	246	4.3	119	2.5	4.6	3.0
08	280	7.6	234	4.5	118	2.9	4.8	3.0
09	290	8.4	233	4.8	114	3.2		2.9
10	294	8.9	235	5.1	114	3.4		2.9
11	303	8.5	234	5.2	113	3.4	4.8	2.9
12	305	9.0	233	5.2	112	3.5	4.9	2.8
13	302	9.8	233	5.2	113	3.5	4.3	2.8
14	295	9.1	236	5.3	110	3.4	4.9	2.8
15	289	9.3	237	5.0	111	3.3	4.8	2.8
16	268	9.4	237	4.7	114	3.0	4.6	2.8
17	258	9.2	257	4.7	117	2.4	4.2	2.9
18	250	9.5			137	2.0	3.6	2.9
19	248	9.1					3.4	2.9
20	246	8.3					3.4	2.8
21	251	7.0					3.2	2.7
22	277	6.3					3.4	2.6
23	296	5.9					3.3	2.6

Time: Local.

Sweep: 0.5 Mc to 16.5 Mc in 5 minutes.

\*Average values except for f°F2 and fEs, which are median values.

#One or two observations only.

Table 27

Bagnaux, France (48.8°N, 2.3°E)

September 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00								
01								
02								
03								
04								
05								
06	290							
07	280		240					
08			255					
09	320		250					
10			220					
11	320		240					
12			230					
13			240					
14			240					
15			250					
16			260					
17			260					
18			250					
19	280		270					
20	280		280					
21	285							
22	310							
23								

Time: 0.0°.

Sweep: 3.9 Mc to 13.4 Mc in 12 minutes, manual operation.

Table 28

Poitiers, France (46.6°N, 2.0°W)

September 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00								
01								
02								
03	330	5.3						2.7
04	320	5.0						2.6
05	300	4.8						2.8
06	260	6.0						3.0
07	250	7.4	232				4.6	3.0
08	255	8.0	220		112	3.3	4.8	3.2
09	260	9.1	220		120	3.3	4.2	3.1
10	255	9.4	220		118	3.4	4.6	3.0
11	260	9.1	210	4.8	115	3.6	4.6	3.1
12	280	9.4	210	4.9	120	3.6	4.7	3.0
13	270	9.4	220		110	3.6	4.7	3.0
14	280	9.9	230		115	3.4	4.8	3.0
15	280	10.0	230		120	3.3	4.4	2.9
16	280	10.0	235		130	3.2	4.5	3.0
17	260	10.0	245				4.2	3.0
18	250	9.4					3.8	3.0
19	240	9.0					5.0	3.0
20	255	8.0					4.1	2.9
21	265	7.3					4.9	2.8
22	300	6.5					(5.0)	2.8
23								

Time: 0.0°.

Sweep: 3.1 Mc to 11.8 Mc in 6 minutes, automatic operation.

Table 29

Calcutta, India (22.6°N, 88.4°E)

September 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	315	10.6				2.4		2.8
01		9.9				2.4		
02		8.9				2.0		
03	(311)	(6.5)				1.8		(2.8)
04		6.9				1.9		
05		7.4				2.0		
06	(310)	7.8				2.2		(2.7)
07		9.7				2.5		
08		10.2				3.0		
09	(360)	10.9				3.4		(2.6)
10		11.0				3.4		
11		11.0				3.6		
12	360	11.0				4.0		2.7
13		11.0				4.4		
14		11.5				4.2		
15	360	11.6				4.2		2.7
16		11.3				4.3		
17		11.0				3.8		
18	375	11.2				3.8		2.6
19		11.0				3.6		
20		11.0				3.4		
21	(330)	10.9				3.0		2.8
22		11.0				2.8		
23		10.8				2.6		

Time: Local.

\*Probably includes fEs observations.

Table 30

Poitiers, France (46.6°N, 2.0°W)

August 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	330	6.6						2.6
01								
02	(325)	5.8						2.6
03	(350)	5.4						2.6
04	325	5.4						(2.6)
05	290	5.4						2.8
06	252	6.5	250				3.4	(3.0)
07	260	7.4	230				4.6	(2.9)
08	288	7.7	230				4.9	(3.0)
09	290	8.3	220				5.0	3.0
10	340	8.5	220				4.8	(2.8)
11	330	8.4	220				5.5	2.8
12	345	8.6	210	5.6			4.8	(2.7)
13	360	8.3	220	5.4			4.6	2.7
14	330	8.4	220	5.4			4.0	2.8
15	320	8.6	225	4.9			3.8	2.8
16	315	8.1	230				4.6	2.9
17	300	8.5	242				4.3	2.9
18	280	8.8	262				4.3	2.9
19	255	8.8					3.1	2.9
20	260	8.4						2.9
21	270	7.8						2.8
22	310	7.0					3.5	2.7
23	312	7.0						2.5

Time: 0.0°.

Sweep: 3.1 Mc to 11.8 Mc in 6 minutes, automatic operation.

Table 31\*

Falkland Is. (51.7°S, 57.8°W)

August 1948

Time	h'F2	f°F2	h'F1	f°F1	h'E	f°E	fEs	F2-M3000
00	386	3.6						2.4
01	383	3.6						2.4
02	372	3.6						2.4
03	355	3.5						2.5
04	312	3.5						2.6
05	296	3.4						2.7
06	273	3.2						2.9
07	244	6.2				2.3		3.2
08	226	(7.6)			135	2.5		3.2
09	224	8.6			119	2.7		3.2
10	232	10.2			110#	2.9#		3.2
11	229	10.0			115#	3.1#		3.2
12	231	10.2	240#	5.6#	110#	3.2#		3.2
13	234	9.5	230#	5.2#				3.2
14	227	(9.1)			140#	2.7#		3.2
15	235	(8.6)			120#	2.7#		3.3
16	230	(7.5)				2.5#		3.1
17	239	6.6						3.1
18	257	5.1						3.0
19	258	4.4						3.0
20	289	3.8						2.8
21	326	3.4						2.5
22	356	3.5						2.5
23	367	3.6					2.6	2.4

Time: Local.

Sweep: 2.2 Mc to 16.0 Mc in 1 minute.

\*Average values except foF2 and fEs, which are median values.

#One or two observations only.

**TABLE 32**  
Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

# IONOSPHERIC DATA

h'F<sub>2</sub> (Characteristics)      Km (Unit)      April 1949 (Month)

Observed at      Washington, D. C.

National Bureau of Standards  
(Institution)

Scaled by:      E.J.W., J.J.S., J.M.C.

Day	75°W										Mean Time										Calculated by: J.J.S., G.P.G., L.H.			
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	250	270	280	280	250	250	250	250	220	220	250	280	220	220	270	250	230	230	240	230	230	(240) <sup>S</sup>	230	250
2	250	270	280	260	270	260	250	C	C	C	240	250	270	200	270	250	250	230	(230) <sup>A</sup>	230	230	240	250	250
3	270	260	290	(280) <sup>S</sup>	260	250	250	240	220	200	240	250	200	200	240	230	230	230	250	220	220	250	250	270
4	270	270	300	(280) <sup>S</sup>	300	270	250	240	220	210	290	(270) <sup>L</sup>	200	220	270	220	200	230	250	230	230	250	270	250
5	260	280	260	250	250	250	250	240	230	220	210	300	280	250	240	230	240	240	240	230	230	250	280	290
6	270	250	250	250	250	250	250	240	240	230	(210) <sup>A</sup>	230	260	250	230	230	230	230	240	240	240	270	(270) <sup>S</sup>	(270) <sup>S</sup>
7	250	250	240	250	250	(250) <sup>S</sup>	260	240	240	230	250	240	250	220	230	230	230	230	280	360	230	280	240	400
8	400	380	420	400	380	400	330	280	G	C	G	G	G	G	G	G	470	530	270	300	300	300	300	300
9	300	300	300	300	300	300	300	240	230	250	(240) <sup>L</sup>	230	(240) <sup>L</sup>	330	230	230	230	230	250	250	250	270	300	300
10	300	320	300	300	280	300	290	250	230	270	250	260	380	360	(360) <sup>L</sup>	350	B	B	260	270	250	250	260	250
11	270	(270) <sup>S</sup>	270	260	270	300	270	250	230	270	260	280	350	330	230	220	220	250	250	250	240	260	260	270
12	260	280	280	300	350	310	240	240	210	230	500	500	620	630	500	450	450	250	270	280	270	280	300	300
13	340	290	270	270	290	310	270	240	230	200	240	250	210	270	210	230	240	240	480	240	230	230	250	300
14	290	280	280	250	280	280	250	240	220	230	(330) <sup>L</sup>	(330) <sup>L</sup>	280	230	270	250	230	230	230	240	230	250	260	270
15	280	270	250	250	270	250	230	230	250	280	270	230	230	210	230	250	250	250	250	230	230	250	280	290
16	280	280	280	250	270	250	230	230	220	250	200	220	240	260	210	230	230	250	230	240	250	270	280	290
17	300	280	(270) <sup>S</sup>	(270) <sup>S</sup>	280	270	270	230	220	250	330	340	340	330	(270) <sup>L</sup>	230	230	250	250	240	250	270	280	290
18	290	260	260	250	250	280	250	230	220	220	330	300	330	300	320	230	230	230	250	250	230	250	280	290
19	300	280	280	280	300	320	270	240	350	390	430	440	450	450	440	400	410	350	250	260	250	260	280	300
20	300	C	C	C	C	C	C	C	C	330	250	270	330	300	350	330	(230) <sup>S</sup>	230	250	230	240	250	270	(270) <sup>S</sup>
21	280	280	280	(280) <sup>S</sup>	270	270	260	240	280	210	230	210	370	350	360	210	230	240	(250) <sup>S</sup>	(230) <sup>S</sup>	220	250	(250) <sup>S</sup>	270
22	270	280	(270) <sup>S</sup>	260	250	260	240	230	220	210	200	300	(340) <sup>L</sup>	340	260	220	220	250	250	240	230	250	270	300
23	290	280	280	300	290	300	260	240	230	280	330	360	360	380	330	360	330	330	250	250	270	280	300	300
24	300	300	270	260	250	280	250	230	240	250	230	360	330	280	360	350	230	230	250	250	250	280	280	290
25	280	280	(260) <sup>S</sup>	250	280	280	270	230	230	220	320	350	340	360	(290) <sup>L</sup>	210	230	230	260	250	250	280	280	290
26	300	280	280	280	280	250	230	230	C	230	300	330	280	(250) <sup>L</sup>	(220) <sup>L</sup>	320	230	250	250	250	250	280	280	290
27	330	300	270	(310) <sup>S</sup>	270	260	250	230	220	300	280	210	340	270	380	330	230	250	250	250	250	280	280	290
28	290	(300) <sup>S</sup>	300	300	290	280	260	240	280	(280) <sup>L</sup>	340	360	370	380	380	250	230	230	250	250	(270) <sup>A</sup>	A	280	300
29	280	280	(260) <sup>S</sup>	270	260	280	260	240	240	250	280	360	360	350	390	C	C	230	240	240	240	C	240	280
30	230	240	290	270	280	280	(270) <sup>S</sup>	240	230	230	300	270	320	340	320	280	230	250	250	240	250	250	250	270
31																								
Median	280	280	280	270	270	280	260	240	230	250	255	280	325	290	270	230	230	240	250	245	245	250	270	280
Count	30	29	29	29	29	29	29	28	27	28	30	30	30	30	30	29	28	27	30	30	30	28	30	30

Sweep 1.0 Mc to 5.0 Mc in 0.25 min

Manual ☐ Automatic ☒

TABLE 33  
Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

National Bureau of Standards  
(Institution)

Scaled by: E.J.W., J.J.S., J.M.C.

Calculated by: L.H., J.J.S., G.P.G.

foF2 \_\_\_\_\_ Mc \_\_\_\_\_ April \_\_\_\_\_, 1949  
(Characteristic) (Unit) (Month)

Observed at Washington, D. C.

L.H. J.J.S. G.P.G.																								
Calculated by:																								
75°W																								
Mean Time																								
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	(7.1) <sup>3</sup>	(7.0) <sup>3</sup>	(6.1) <sup>3</sup>	(6.8) <sup>3</sup>	(5.9) <sup>3</sup>	(5.4) <sup>3</sup>	(6.4) <sup>3</sup>	(8.3) <sup>3</sup>	(10.0) <sup>3</sup>	(10.6) <sup>3</sup>	(11.0) <sup>3</sup>	(11.5) <sup>3</sup>	(12.0) <sup>3</sup>	(11.8) <sup>3</sup>	(12.3) <sup>3</sup>	(11.8) <sup>3</sup>	(11.0) <sup>3</sup>	(11.0) <sup>3</sup>	(10.2) <sup>3</sup>	(9.6) <sup>3</sup>	(9.0) <sup>3</sup>	8.6	8.4	8.2
2	8.0	7.2	6.8	(6.6) <sup>3</sup>	6.4	6.2	(7.1) <sup>3</sup>	C	C	C	11.6	12.0	12.2	12.0	12.0	11.4	11.3	(11.2) <sup>3</sup>	(11.0) <sup>3</sup>	(10.2) <sup>3</sup>	8.7	8.5	8.0	(2.6) <sup>3</sup>
3	(7.3) <sup>3</sup>	(7.1) <sup>3</sup>	6.6	6.6	6.6	6.4	7.0	8.5	(9.6) <sup>3</sup>	10.8	11.2	11.6	11.3	11.1	12.0	(11.3) <sup>3</sup>	11.0	(10.5) <sup>3</sup>	(10.6) <sup>3</sup>	(9.7) <sup>3</sup>	8.4	7.9	7.5	(2.6) <sup>3</sup>
4	(2.4) <sup>3</sup>	(2.2) <sup>3</sup>	(2.1) <sup>3</sup>	(2.0) <sup>3</sup>	6.5	6.7	7.1	7.9	9.0	9.0	(9.3) <sup>3</sup>	10.1	10.8	10.9	10.7	10.4	10.2	(10.2) <sup>3</sup>	(10.0) <sup>3</sup>	(9.3) <sup>3</sup>	8.4	(7.9) <sup>3</sup>	(8.3) <sup>3</sup>	8.2
5	(2.4) <sup>3</sup>	(2.1) <sup>3</sup>	(2.1) <sup>3</sup>	6.6	6.5	6.5	5.6	5.4	8.4	(9.7) <sup>3</sup>	10.3	11.1	11.3	11.8	(11.3) <sup>3</sup>	11.2	10.8	(10.2) <sup>3</sup>	(10.0) <sup>3</sup>	(9.3) <sup>3</sup>	8.6	(8.0) <sup>3</sup>	8.1	(9.7) <sup>3</sup>
6	(8.4) <sup>3</sup>	(2.6) <sup>3</sup>	(2.1) <sup>3</sup>	6.4	(5.7) <sup>3</sup>	5.6	6.7	8.4	9.7	10.5	11.0	11.5	11.4	11.5	11.4	11.2	11.1	10.5	(10.2) <sup>3</sup>	(9.9) <sup>3</sup>	8.7	8.6	8.5	8.6
7	8.5	8.0	7.0	6.2	5.7	5.5	6.5	8.3	9.6	9.8	10.6	11.0	11.4	11.9	11.9	11.0	10.8	(10.0) <sup>3</sup>	(9.9) <sup>3</sup>	9.2	(10.4) <sup>3</sup>	9.2	(8.1) <sup>3</sup>	4.5 <sup>3</sup>
8	(4.5) <sup>3</sup>	(3.8) <sup>3</sup>	(2.6) <sup>3</sup>	2.6	3.1	2.9	3.6	4.0	4.3	4.3	4.3	4.3	4.6	4.7	4.6	4.6	5.0	5.2	5.2	5.2	(5.0) <sup>3</sup>	(4.5) <sup>3</sup>	(4.4) <sup>3</sup>	4.2
9	(4.1) <sup>3</sup>	3.7	3.6	3.5	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
10	6.6	(6.0) <sup>3</sup>	5.6	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2
11	6.3	5.9	5.7	5.3	4.8	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
12	(6.9) <sup>3</sup>	(6.4) <sup>3</sup>	(5.5) <sup>3</sup>	(4.8) <sup>3</sup>	4.1	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
13	5.5	5.6	(5.6) <sup>3</sup>	4.7	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
14	7.0	6.7	6.5	(5.7) <sup>3</sup>	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
15	(7.7) <sup>3</sup>	(2.6) <sup>3</sup>	2.2	6.4	6.1	5.7	2.3	8.6	(9.8) <sup>3</sup>	10.8	11.0	11.9	12.0	12.0	11.9	11.9	11.3	(11.2) <sup>3</sup>	(10.8) <sup>3</sup>	(9.8) <sup>3</sup>	8.7	(8.4) <sup>3</sup>	7.8	7.6
16	7.5	7.0	7.0	6.5	6.4	6.1	(6.9) <sup>3</sup>	8.0	9.0	9.4	10.7	11.7	11.5	12.2	(12.3) <sup>3</sup>	11.9	11.3	(11.2) <sup>3</sup>	(11.0) <sup>3</sup>	(9.8) <sup>3</sup>	9.0	(8.0) <sup>3</sup>	8.0	7.9
17	7.7	7.3	7.1	6.6	5.7	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
18	7.1	6.9	6.5	5.7	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
19	6.7	6.7	6.6	(5.7) <sup>3</sup>	5.3	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
20	6.3	C	C	C	C	C	C	C	C	9.6	10.1	10.5	10.5	10.3	10.3	10.0	(9.7) <sup>3</sup>	(9.5) <sup>3</sup>	(9.7) <sup>3</sup>	9.1	8.7	8.2	7.7	7.1
21	7.3	7.1	6.7	(6.8) <sup>3</sup>	6.7	6.6	7.5	8.3	8.7	9.3	9.5	9.6	9.7	9.9	9.9	9.4	9.3	9.5	(9.7) <sup>3</sup>	(9.3) <sup>3</sup>	8.8	8.0	(2.0) <sup>3</sup>	7.2
22	6.9	6.9	6.8	6.7	6.4	6.1	8.3	10.1	10.3	11.0	11.4	11.7	11.3	11.1	11.1	10.6	10.4	(10.0) <sup>3</sup>	(9.6) <sup>3</sup>	(9.2) <sup>3</sup>	8.8	8.5	7.7	7.5
23	(7.7) <sup>3</sup>	6.8	6.6	6.5	6.5	6.0	6.5	(7.1) <sup>3</sup>	7.9	8.3	8.9	9.7	9.5	9.7	9.3	9.4	9.1	8.8	8.6	8.4	8.3	7.3	6.9	6.8
24	6.6	6.4	6.3	6.2	5.4	5.5	7.2	8.6	9.6	9.6	10.3	10.5	10.2	10.5	10.5	10.4	10.2	9.8	9.4	(9.2) <sup>3</sup>	9.0	8.1	8.0	7.6
25	7.3	7.0	7.0	6.3	5.7	5.8	7.0	8.3	9.6	11.0	10.5	11.0	10.5	10.5	10.3	10.0	(9.7) <sup>3</sup>	(9.8) <sup>3</sup>	(9.7) <sup>3</sup>	(9.5) <sup>3</sup>	9.0	8.3	(8.0) <sup>3</sup>	7.8
26	7.9	7.9	7.2	7.0	7.1	(7.1) <sup>3</sup>	8.5	(10.0) <sup>3</sup>	10.5	11.2	11.4	11.3	11.2	11.2	10.8	11.0	10.6	(10.3) <sup>3</sup>	9.7	9.5	8.9	(8.2) <sup>3</sup>	8.3	(2.4) <sup>3</sup>
27	6.8	7.8	(6.7) <sup>3</sup>	6.1	6.3	(5.8) <sup>3</sup>	6.7	8.4	9.0	9.6	10.0	10.0	10.4	10.7	10.5	10.0	(9.9) <sup>3</sup>	9.8	(9.6) <sup>3</sup>	9.3	8.5	7.8	7.5	6.9
28	7.0	(6.8) <sup>3</sup>	6.5	6.4	6.3	6.5	7.6	7.9	8.4	9.0	9.6	9.1	9.9	9.7	9.8	9.8	9.9	9.5	9.3	9.4	8.6	8.1	7.5	7.0
29	6.6	6.5	6.5	6.2	5.6	5.7	7.4	8.5	9.5	9.7	10.4	10.8	9.9	10.2	11.0	[10.9] <sup>3</sup>	[10.6] <sup>3</sup>	[10.6] <sup>3</sup>	[10.5] <sup>3</sup>	(9.3) <sup>3</sup>	8.5	[8.4] <sup>3</sup>	8.0	(8.1) <sup>3</sup>
30	7.8	7.1	6.9	6.5	(5.7) <sup>3</sup>	5.8	7.3	8.4	9.6	10.3	10.5	11.0	11.2	11.4	11.2	10.8	10.4	10.5	10.2	9.8	9.0	8.7	8.4	(7.7) <sup>3</sup>
31																								
Median	7.1	6.9	6.6	6.3	5.7	5.6	6.7	8.3	9.2	9.6	10.2	10.6	10.6	10.6	10.6	10.5	10.3	10.0	(9.7)	(9.4)	8.6	8.0	7.8	7.4
Count	30	29	29	29	29	29	29	29	29	29	30	30	30	30	30	30	30	30	29	29	29	29	29	30

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

TABLE 34

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

## IONOSPHERIC DATA

National Bureau of Standards

(Institution)

Scaled by E.J.W., J.J.S. J.M.C.

foF<sub>2</sub> \_\_\_\_\_ Mc \_\_\_\_\_ April \_\_\_\_\_ 1949

(Characteristics)

Observed at Washington, D. C.

Day	77.5°W										75°W										J.J.S., L.H., G.P.G.									
	0030	0130	0230	0330	0430	0530	0630	0730	0830	0930	1030	1130	1230	1330	1430	1530	1630	1730	1830	1930	2030	2130	2230	2330						
1	(7.0) <sup>3</sup>	(6.4) <sup>3</sup>	(6.3) <sup>3</sup>	(6.1) <sup>3</sup>	(5.9) <sup>3</sup>	(6.1) <sup>3</sup>	(7.3) <sup>3</sup>	9.2	10.5	10.8	11.2	11.7	12.0	12.2	11.7	11.3	11.0	(10.8) <sup>3</sup>	(10.5) <sup>3</sup>	(9.3) <sup>3</sup>	(8.7) <sup>3</sup>	8.5	8.3	8.2	8.2					
2	(7.6) <sup>3</sup>	7.0	6.5	(6.3) <sup>3</sup>	5.8	(6.2) <sup>3</sup>	C		C	C	11.6	12.2	(12.0) <sup>3</sup>	11.6	(11.5) <sup>3</sup>	11.3	(11.1) <sup>3</sup>	(10.8) <sup>3</sup>	(10.5) <sup>3</sup>	(9.5) <sup>3</sup>	8.6	8.2	7.8	(7.2) <sup>3</sup>						
3	(7.2) <sup>3</sup>	6.8	6.5	(6.5) <sup>3</sup>	6.5	(6.5) <sup>3</sup>	7.8 F	9.1	10.5	11.0	11.5	11.4	(11.0) <sup>3</sup>	11.4	(11.7) <sup>3</sup>	11.3	(10.8) <sup>3</sup>	(10.5) <sup>3</sup>	10.3	9.3	8.4	8.0	(7.0) <sup>3</sup>	(7.0) <sup>3</sup>						
4	(7.6) <sup>3</sup>	(7.1) <sup>3</sup>	6.6	(6.4) <sup>3</sup>	6.5 F	(6.7) <sup>3</sup>	7.1	8.5	9.2	9.5	9.8	10.4	10.8	11.0	10.5	10.4	(10.2) <sup>3</sup>	(9.8) <sup>3</sup>	(9.5) <sup>3</sup>	8.9	7.9	(8.0) <sup>3</sup>	8.5	7.6						
5	(6.8) <sup>3</sup>	(7.0) <sup>3</sup>	(6.0) <sup>3</sup>	6.6 F	6.0	5.7	7.3	9.2	9.8	10.6	11.2	11.5	11.9	11.0	11.4	11.0	(10.5) <sup>3</sup>	(10.2) <sup>3</sup>	9.9	9.1	8.3	(8.0) <sup>3</sup>	(8.2) <sup>3</sup>	8.2						
6	(7.9) <sup>3</sup>	(7.5) <sup>3</sup>	(7.1) <sup>3</sup>	(6.3) <sup>3</sup>	(5.7) <sup>3</sup>	(5.6) <sup>3</sup>	7.5	9.3	10.0	11.0	11.4	11.3	11.5	11.8	11.2	11.1	11.0	10.5	(10.2) <sup>3</sup>	9.6	(8.6) <sup>3</sup>	8.5	8.5	8.8						
7	8.5	(7.5) <sup>3</sup>	6.5	5.8	(5.5) <sup>3</sup>	5.7	7.3	8.6	9.2	10.3	10.6	11.3	11.8	11.7	11.4	10.8	(10.6) <sup>3</sup>	(9.8) <sup>3</sup>	(9.6) <sup>3</sup>	(9.6) <sup>3</sup>	(10.3) <sup>3</sup>	8.8	(6.3) <sup>3</sup>	(4.1) <sup>3</sup>						
8	(3.7) <sup>3</sup>	3.6 K	2.7 K	2.8 K	3.1 K	3.1 K	3.9 K	G K	G K	C K	G K	G K	G K	G K	G K	C K	5.2 K	(5.0) <sup>3</sup>	5.3 K	(4.9) <sup>3</sup>	(4.6) <sup>3</sup>	(4.2) <sup>3</sup>	4.1 K							
9	(3.9) <sup>3</sup>	3.7 K	3.4 K	3.4 K	3.1 K	(4.1) <sup>3</sup>	6.6	7.7	8.8	9.3	9.8	10.0	10.2	10.4	10.1	(10.2) <sup>3</sup>	10.0	(9.8) <sup>3</sup>	(9.5) <sup>3</sup>	8.9	7.7	7.8	7.4	7.3						
10	6.5	6.3 K	(6.3) <sup>3</sup>	5.7	(5.1) <sup>3</sup>	4.9 F	6.3 K	7.0 K	7.3 K	7.3 K	8.2 K	8.6 K	9.3 K	9.5 K	(9.8) <sup>3</sup>	10.0	(9.4) <sup>3</sup>	10.0	9.3	9.0	7.9	7.4	7.0	6.6						
11	6.2 F	(5.7) <sup>3</sup>	5.3 F	4.5	(5.3) <sup>3</sup>	7.4	9.5	9.5	9.2	9.4	(10.4) <sup>3</sup>	11.0	11.2	(10.9) <sup>3</sup>	11.3	10.9	(10.5) <sup>3</sup>	(10.2) <sup>3</sup>	(10.1) <sup>3</sup>	9.1	(8.0) <sup>3</sup>	(7.7) <sup>3</sup>	(7.6) <sup>3</sup>	(6.9) <sup>3</sup>						
12	(6.0) <sup>3</sup>	(5.9) <sup>3</sup>	(4.9) <sup>3</sup>	(4.3) <sup>3</sup>	(4.0) <sup>3</sup>	(4.3) <sup>3</sup>	5.5 K	(6.0) <sup>3</sup>	(6.1) <sup>3</sup>	6.1 K	6.0 K	6.5 K	6.5 K	7.1 K	6.8 K	6.7 K	(7.0) <sup>3</sup>	6.9 K	7.1 K	(6.9) <sup>3</sup>	6.6 K	6.5 K	(5.7) <sup>3</sup>	5.5 K						
13	(5.7) <sup>3</sup>	(5.6) <sup>3</sup>	(4.9) <sup>3</sup>	(4.2) <sup>3</sup>	4.0	4.8	7.3	(9.7) <sup>3</sup>	10.5	(11.5) <sup>3</sup>	(10.8) <sup>3</sup>	10.6	10.5	10.5	(10.0) <sup>3</sup>	(10.4) <sup>3</sup>	(10.4) <sup>3</sup>	(10.4) <sup>3</sup>	(10.4) <sup>3</sup>	5	5	(8.7) <sup>3</sup>	(7.6) <sup>3</sup>	(7.3) <sup>3</sup>	7.1					
14	(6.9) <sup>3</sup>	6.5 F	(6.0) <sup>3</sup>	(5.4) <sup>3</sup>	3.7 F	(4.3) <sup>3</sup>	6.2 F	6.4 F	(7.0) <sup>3</sup>	7.5	8.0 F	9.7	10.6	10.7	11.0	10.8	(10.8) <sup>3</sup>	10.6	(10.5) <sup>3</sup>	9.6	8.6	(8.2) <sup>3</sup>	(8.0) <sup>3</sup>	(7.6) <sup>3</sup>						
15	(7.0) <sup>3</sup>	(7.3) <sup>3</sup>	6.6	6.2	5.8	6.4	8.0	9.5	(10.2) <sup>3</sup>	11.0	11.8	12.0	12.0	12.2	12.0	11.5	(10.8) <sup>3</sup>	(11.0) <sup>3</sup>	(10.8) <sup>3</sup>	(9.8) <sup>3</sup>	9.1	8.6	7.9	7.4						
16	(7.4) <sup>3</sup>	7.0	(7.1) <sup>3</sup>	6.5	6.2	6.5	7.1	8.7	9.3	10.5	11.0	11.5	(12.0) <sup>3</sup>	12.0	(12.3) <sup>3</sup>	11.5	(11.2) <sup>3</sup>	11.3	(10.6) <sup>3</sup>	9.3	8.9	8.0	7.4	7.8						
17	7.7	(7.2) <sup>3</sup>	6.7	6.2	5.7	(5.7) <sup>3</sup>	6.8	7.5	8.3	8.4	9.1	9.4	9.4	9.6	9.7	9.5	9.5	9.7	9.6	8.7	8.0	7.2	(7.1) <sup>3</sup>	6.8						
18	(7.1) <sup>3</sup>	6.6	6.3	5.3	(4.8) <sup>3</sup>	5.6	7.8	8.6	9.0	9.1	9.5	10.0	10.3	10.6	10.6	10.3	7.4 K	7.4 K	7.5 K	7.3 K	7.1 K	7.0 K	(6.2) <sup>3</sup>	6.5 K						
19	6.8	6.7	5.7	5.3	5.2	5.7	6.8 K	(6.7) <sup>3</sup>	6.7 K	6.9 K	7.0 K	7.1 K	7.2 K	7.3 K	7.7 K	7.6 K	9.5	(9.8) <sup>3</sup>	9.6	9.0	8.4	7.7	7.4	7.1						
20	C	C	C	C	C	C	C	C	C	10.0	10.5	10.4	10.5	10.3	(10.3) <sup>3</sup>	9.9	9.5	(9.8) <sup>3</sup>	9.6	9.0	8.4	7.7	7.4	7.1						
21	7.2	6.9 F	6.9 F	(6.8) <sup>3</sup>	6.3 F	6.7 F	8.0	8.5	9.0	9.5	9.5	9.5	9.7	9.9	9.7	9.5	9.3	(9.4) <sup>3</sup>	9.5	9.0	8.4	7.7	(7.4) <sup>3</sup>	(6.9) <sup>3</sup>						
22	6.9	(6.9) <sup>3</sup>	6.7	6.5	6.1 F	6.6 F	9.3	10.0	10.6	11.3	11.5	11.4	11.2	11.1	10.7	(10.4) <sup>3</sup>	(10.2) <sup>3</sup>	10.0	(9.7) <sup>3</sup>	9.3	8.7	8.0	(7.7) <sup>3</sup>	7.5						
23	7.0	6.6	6.5	6.6 F	6.1 F	6.1 F	6.8 F	7.8	8.1	8.8	9.0	9.4	9.7	9.3	9.2	9.4	9.0	8.7	8.5	8.4	7.9	7.3	6.8	6.6						
24	6.6 F	6.5 F	6.3 F	5.9 F	5.2	5.9	8.4	7.2	10.0	10.0	10.0	11.0	10.9	10.5	10.4	(10.3) <sup>3</sup>	9.8	9.4	(9.7) <sup>3</sup>	9.2	8.4	8.0	8.0	7.4						
25	(7.1) <sup>3</sup>	7.1	6.8	5.8	5.7	6.3	7.6	9.1	10.0	10.4	10.5	11.0	10.3	10.2	10.0	(9.7) <sup>3</sup>	(9.8) <sup>3</sup>	9.6	(9.5) <sup>3</sup>	9.4	8.7	(8.2) <sup>3</sup>	7.8	(7.7) <sup>3</sup>						
26	7.9	7.7	7.0	7.2	6.9	7.3	8.9	(10.2) <sup>3</sup>	10.7	11.2	11.0	11.3	11.3	11.1	11.0	(10.7) <sup>3</sup>	(10.4) <sup>3</sup>	(10.2) <sup>3</sup>	9.7	(9.5) <sup>3</sup>	8.6	(8.3) <sup>3</sup>	(7.9) <sup>3</sup>	7.1						
27	7.0	7.1	6.2	6.3	(6.3) <sup>3</sup>	5.9	(7.6) <sup>3</sup>	8.8	9.0	10.0	10.0	10.4	10.7	10.5	10.3	9.9	9.7	(9.8) <sup>3</sup>	9.4	9.0	8.3	7.6	(7.1) <sup>3</sup>	6.8 F						
28	6.9 F	6.7	6.4	6.4	6.3	7.1	7.7	8.5	8.7	8.7	9.5	10.0	9.6	9.8	10.0	(9.7) <sup>3</sup>	9.6	9.5	(9.5) <sup>3</sup>	9.4	8.4	7.5	7.0	(7.0) <sup>3</sup>						
29	6.5	6.6	6.3	6.0	5.5	6.7	7.9	9.1	9.7	10.2	10.7	10.7	10.6	10.7	11.2	10.6	10.4	10.7	(9.7) <sup>3</sup>	8.7	8.4	8.4	(8.0) <sup>3</sup>	(7.8) <sup>3</sup>						
30	7.3	7.0	6.5	6.4	5.6	6.6	7.8	9.3	9.6	10.4	10.7	11.2	11.3	11.3	11.0	10.3	10.4	10.4	9.7	9.7	8.9	8.5	8.0	(7.9) <sup>3</sup>						
31																														
Median	(7.0)	6.8	6.5	6.2	5.7	5.9	7.4	8.6	9.2	10.0	10.4	10.6	10.6	10.6	10.4	10.4	10.2	9.8	9.6	9.1	8.4	8.0	7.6	7.2						
Count	29	29	29	29	29	29	28	28	28	28	30	30	30	30	30	29	30	30	30	30	30	30	30	30						

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

TABLE 35  
Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

National Bureau of Standards

Scaled by E.J.W., J.J.S. (Institution) J.M.C.

Calculated by L.H., J.J.S. G.P.G.

# IONOSPHERIC DATA

h'F1 (Characteristic) Km (Unit) April 1949 (Month)  
Observed at Washington, D. C.

Lat 39.0°N, Long 77.5°W

Calculated by L.H. J.J.S. G.P.G.																								
75°W																								
Mean Time																								
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									Q	Q	210	200	Q	220	200	Q	Q	Q						
2									C	C	Q	200	200	Q	200	220	220	Q						
3									Q	Q	200	200	Q	Q	Q	Q	Q	Q						
4									Q	Q	210	200 <sup>H</sup>	Q	Q	Q	Q	Q	Q						
5									Q	Q	Q	220	220	Q	Q	Q	Q	Q						
6									Q	Q	Q	200	210	200	Q	Q	Q	Q						
7									220	Q	200	Q	200	Q	Q	Q	Q	Q						
8									250 <sup>K</sup>	C	210 <sup>K</sup>	210 <sup>K</sup>	220 <sup>H</sup>	230 <sup>K</sup>	250 <sup>K</sup>	240 <sup>K</sup>	240 <sup>K</sup>	260 <sup>K</sup>						
9									Q	210	200	Q	200	210	Q	230	Q	Q						
10									Q <sup>K</sup>	230 <sup>K</sup>	210 <sup>K</sup>	200 <sup>K</sup>	210 <sup>K</sup>	230 <sup>K</sup>	240 <sup>K</sup>	230	B	B						
11									Q	220	190	210 <sup>H</sup>	210	200	Q	Q	Q	Q						
12									Q <sup>K</sup>	230 <sup>K</sup>	220 <sup>K</sup>	200 <sup>K</sup>	210 <sup>K</sup>	(230) <sup>K</sup>	240 <sup>K</sup>	230 <sup>K</sup>	230 <sup>K</sup>	Q <sup>K</sup>						
13									Q	Q	190	Q	Q	210	Q	Q	Q	Q						
14									Q	220 <sup>H</sup>	200	200	210	Q	210	210	Q	Q						
15									220 <sup>H</sup>	210	220	230	220	210	Q	200	220 <sup>H</sup>	Q						
16									Q	200 <sup>H</sup>	Q	Q	200	A	Q	Q	220	Q						
17									Q	200	200	200	(220) <sup>K</sup>	230	220	Q	Q	Q						
18									Q	Q	200	200	200	200	210	Q	Q	Q						
19									220 <sup>K</sup>	220 <sup>K</sup>	220 <sup>K</sup>	(250) <sup>K</sup>	(240) <sup>K</sup>	230 <sup>K</sup>	260 <sup>K</sup>	210 <sup>H</sup>	230 <sup>K</sup>	230 <sup>K</sup>						
20									C	240	200	180	220	220	200	220	Q	Q						
21									230	Q	200	Q	200	200	(230) <sup>K</sup>	Q	Q	Q						
22									Q	Q	Q	220	210	220	210	Q	Q	Q						
23									Q	220	210	200	220	220	210	230	Q	Q						
24									Q	Q	Q	230	200	200	200	250	Q	Q						
25									Q	Q	210	200	200	230	220	Q	Q	Q						
26									C	Q	210	210	200	230	Q	230	Q	Q						
27									Q	210	200	Q	220	210	200	230	Q	Q						
28									Q	(230) <sup>K</sup>	200	220	210	230	200	Q	Q	Q						
29									Q	220	200	A	(240) <sup>S</sup>	(230) <sup>S</sup>	250	C	C	Q						
30									Q	Q	220 <sup>H</sup>	200	200	230	230	220	Q	Q						
31																								
Median									220	220	200	200	210	220	215	230	225	-						
Count									5	14	24	23	26	24	20	14	6	2						

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

TABLE 36

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

## IONOSPHERIC DATA

foF1 \_\_\_\_\_ Mc \_\_\_\_\_ April \_\_\_\_\_ 1949  
 (Characteristic) (Unit) (Month)  
 Observed at Washington, D. C.  
 Lat. 39.0°N Long. 77.5°W

National Bureau of Standards  
 Scaled by E. J. W., J. J. S., J. M. C.  
 Calculated by G. P. G., J. J. S., L. H.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									Q	Q	L	L	Q	L	L	Q	Q	Q						
2									C	C	Q	L	L	Q	L	L	L	Q	Q					
3									Q	Q	L	L	Q	Q	Q	Q	Q	Q	Q					
4									Q	Q	L	L	Q	Q	Q	Q	Q	Q	Q					
5									Q	Q	Q	L	L	49	Q	Q	Q	Q	Q					
6									Q	Q	Q	46	53	L	Q	Q	Q	Q	Q					
7									L	Q	L	Q	L	Q	Q	Q	Q	Q	Q					
8									38 <sup>K</sup>	C <sup>K</sup>	43 <sup>K</sup>	43 <sup>K</sup>	46 <sup>K</sup>	47 <sup>K</sup>	46 <sup>K</sup>	46 <sup>K</sup>	43 <sup>K</sup>	41 <sup>K</sup>						
9									Q	L	L	Q	L	L	Q	L	Q	Q	Q					
10									Q <sup>K</sup>	47 <sup>K</sup>	46 <sup>K</sup>	47 <sup>K</sup>	61	59 <sup>K</sup>	L <sup>K</sup>	L	B	B						
11									Q	L	49 <sup>K</sup>	L	L	L	Q	Q	Q	Q						
12									Q <sup>K</sup>	53 <sup>K</sup>	53 <sup>K</sup>	52 <sup>K</sup>	50 <sup>K</sup>	51 <sup>K</sup>	55 <sup>K</sup>	53 <sup>K</sup>	50 <sup>K</sup>	Q <sup>K</sup>						
13									Q	Q	L	Q	Q	L	Q	Q	Q	Q	Q					
14									Q	Q	L	L	L	Q	L	L	Q	Q	Q					
15									L	L	L	L	L	L	Q	L	L	Q	Q					
16									Q	43	Q	Q	L	L	Q	Q	L	Q	Q					
17									Q	47	L	L	60	L	L	Q	Q	Q	Q					
18									Q	Q	59	56	59	53	59	Q	Q	Q	Q					
19									53 <sup>K</sup>	55 <sup>K</sup>	55 <sup>K</sup>	53 <sup>K</sup>	53 <sup>K</sup>	56 <sup>K</sup>	56 <sup>K</sup>	57 <sup>K</sup>	55 <sup>K</sup>	L <sup>K</sup>						
20									C	L	L	50	L	58	L	L	Q	Q	Q					
21									L	Q	L	Q	L	L	L	Q	Q	Q	Q					
22									Q	Q	Q	L	L	62	L	Q	Q	Q	Q					
23									Q	L	59	61	65	65	55	56	Q	Q	Q					
24									Q	Q	Q	64	L	L	64	L	Q	Q	Q					
25									Q	Q	(54) <sup>5</sup>	L	L	65	L	Q	Q	Q	Q					
26									C	Q	L	L	L	L	Q	L	Q	Q	Q					
27									Q	L	L	Q	64	51	65	L	Q	Q	Q					
28									Q	L	64	59	64	L	59	Q	Q	Q	Q					
29									Q	L	L	A	65	56	L	C	C	Q	Q					
30									Q	Q	L	L	60	L	L	L	Q	Q	Q					
31																								
Median																								
Count									47	56	52	60	56	58										

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

# TABLE 37 IONOSPHERIC DATA

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

National Bureau of Standards  
(Institution)

Scaled by E.J.W., J.J.S., J.M.C.

Calculated by L.H., G.P.G., J.J.S.

h'E (Characteristic) Km (Unit) April 1949  
Observed at Washington, D.C.

Lat. 39.0°N, Long. 77.5°W

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								100	100	100	100	(130)A	(100)A	100	100	100	100	100	100					
2								C	C	C	100	100	100	100	100	100	100	100	100					
3								100	100	100	100	100	100	100	100	100	100	100	100					
4								100	100	100	100	100	100	100	100	100	100	100	100					
5							130	100	100	100	100	100	100	100	100	100	100	100	100					
6							130	100	100	100	100	(100)A	(100)A	(120)A	100	100	100	100	100					
7							110	100	100	100	100	(100)A	(100)A	100	100	100	100	100	100					
8							110K	100K	100K	C	100K	100K	100K	100K	100K	100K	100K	100K	100K					
9							110	100	100	100	100	100	100	100	100	100	100	100	100					
10							110K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K					
11							100	100	100	100	100	(100)A	(100)A	100	100	100	100	100	100					
12							130K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K					
13							130	100	100	100	100	100	100	100	100	100	100	100	100					
14							130	100	100	100	100	100	100	100	100	100	100	100	100					
15							130	100	100	100	100	100	100	100	100	100	100	100	100					
16							130	140	100	100	100	100	100	100	100	100	100	100	100					
17							130	100	100	100	100	100	100	100	100	100	100	100	100					
18							130	100	100	100	100	100	100	100	100	100	100	100	100					
19							120K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K	100K					
20							C	C	C	100	100	100	100	100	100	100	100	100	100					
21							120	100	100	100	100	100	100	100	100	100	100	100	100					
22							110	100	100	100	100	100	100	100	100	100	100	100	100					
23							130	100	100	100	100	A	100	100	100	100	100	100	100					
24							110	100	100	100	100	100	100	100	100	100	100	100	100					
25							110	100	100	100	100	100	100	100	100	100	100	100	100					
26							120	100	100	100	100	100	100	100	100	100	100	100	100					
27							120	100	100	100	100	100	100	100	100	100	100	100	100					
28							120	100	100	100	100	100	100	100	100	100	100	100	100					
29							120	100	100	100	100	100	100	100	100	100	100	100	100					
30							120	100	100	100	100	100	100	100	100	100	100	100	100					
31																								
Median							120	100	100	100	100	100	100	100	100	100	100	100	100					
Count							22	28	27	28	30	27	30	30	30	30	28	29	30					

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

TABLE 38

National Bureau of Standards, Washington 25, D. C.

National Bureau of Standards

Scored by E.J.W., J.J.S. J.M.C.

Calculated by L.H., J.J.S., G.P.G.

## IONOSPHERIC DATA

75°W Mean Time

Lat 39.0°N Long 77.5°W

foE (Characteristic) Mc (Unit) April 1949

Observed at Washington, D.C.

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1								24	(29) <sup>A</sup> 33	33	37	[37] <sup>A</sup> 37	39	37	32	27	20								
2								C	C	C	37	37	37	38	37	36	33	28	(29) <sup>A</sup>						
3								24	30 <sup>H</sup> 33	[35] <sup>A</sup> 37	(39) <sup>S</sup> 39	(39) <sup>S</sup> 37	39	39	39	36	33	27	22 <sup>H</sup>						
4								24 <sup>H</sup>	[29] <sup>A</sup> 34	(37) <sup>S</sup> 39	(39) <sup>S</sup> 37	39 <sup>H</sup> 39	(38) <sup>A</sup> 35 <sup>H</sup>	37	36	32	28	22 <sup>H</sup>							
5								19	25	31	33	35	37	39 <sup>H</sup> 39	(38) <sup>A</sup> 35 <sup>H</sup>	37	35	31	(29) <sup>S</sup> 21						
6								19 <sup>H</sup>	26	31	33	33	37	[36] <sup>A</sup> 35	37	35	32	27	19						
7								25	31	34	35	A	A	37	(35) <sup>S</sup> 37	(34) <sup>A</sup> 35 <sup>H</sup>	(28) <sup>A</sup> 21								
8								20 <sup>K</sup>	26 <sup>K</sup> 31 <sup>K</sup>	[33] <sup>A</sup> 35 <sup>K</sup> 34 <sup>K</sup>	35 <sup>K</sup> 37 <sup>K</sup>	37 <sup>K</sup> 39 <sup>H</sup> 39	[36] <sup>A</sup> 35 <sup>H</sup> 35 <sup>K</sup>	35 <sup>K</sup>	35 <sup>K</sup>	31 <sup>K</sup> 28 <sup>K</sup>	22 <sup>K</sup>								
9								27	(31) <sup>A</sup> 35	(37) <sup>A</sup> 39	39 <sup>H</sup> 39	39 <sup>H</sup> 39	38 <sup>K</sup> 36	36	32	28 <sup>H</sup> 22 <sup>H</sup>									
10								19 <sup>K</sup>	26 <sup>K</sup> 31 <sup>K</sup>	31 <sup>K</sup> 34 <sup>K</sup>	36 <sup>K</sup> 38 <sup>K</sup>	A	A	A	37 <sup>K</sup> 35	35	30	24							
11								26 <sup>H</sup>	26 <sup>H</sup> 31 <sup>H</sup>	31 <sup>H</sup> 34 <sup>H</sup>	37 <sup>H</sup> 39 <sup>H</sup>	39 <sup>H</sup> 39	38 <sup>K</sup> 36	37 <sup>K</sup> 35	36	32	28 <sup>H</sup> 22 <sup>H</sup>								
12								19 <sup>K</sup>	26 <sup>K</sup> 31 <sup>K</sup>	31 <sup>K</sup> 34 <sup>K</sup>	36 <sup>K</sup> 38 <sup>K</sup>	39 <sup>H</sup> 39	38 <sup>K</sup> 36	37 <sup>K</sup> 35	36	32	28 <sup>H</sup> 22 <sup>H</sup>								
13								21	28	32	35	37	39	40	38	37	35	31	27	21					
14								19	24	29	31	34	(36) <sup>A</sup>	[37] <sup>A</sup> 38 <sup>H</sup>	(37) <sup>A</sup> 35 <sup>H</sup>	35 <sup>H</sup>	32	27	22						
15								19 <sup>K</sup>	26	(31) <sup>A</sup> 35	(33) <sup>A</sup> 36 <sup>H</sup>	37 <sup>K</sup>	38	37	36 <sup>K</sup> 35	35	33	28	22 <sup>H</sup>						
16								21	26 <sup>K</sup> 31	(35) <sup>A</sup> 36	A	A	37 <sup>H</sup> A	A	A	35	33 <sup>H</sup> 29	25							
17								20 <sup>K</sup>	27	31	34	36	38 <sup>K</sup> 39	37	36	33	29	22							
18								19	26 <sup>H</sup>	32	33	35	(35) <sup>A</sup>	[37] <sup>A</sup> 39	[38] <sup>A</sup> 36	34	31	23							
19								19 <sup>K</sup>	28 <sup>K</sup>	33 <sup>K</sup> 34 <sup>K</sup>	34 <sup>K</sup> 37 <sup>K</sup>	37 <sup>K</sup> 39 <sup>H</sup>	A	A	37 <sup>K</sup> 37 <sup>K</sup>	37 <sup>K</sup>	36 <sup>K</sup> [30] <sup>A</sup> 25 <sup>K</sup>								
20								C	C	C	35	(35) <sup>S</sup> 39	[37] <sup>A</sup> 39	40	39	37	35	30	23						
21								A	27	32	35	37	39	A	A	A	A	30	(22) <sup>A</sup>						
22								19	26	31	34	36	38 <sup>K</sup> 39	37	36	33	29	22							
23								20	25	31	34	36	38 <sup>K</sup> 39	37	36	33	29	22							
24								23 <sup>H</sup>	30	32	35	A	A	(37) <sup>K</sup> 40	39	37	(34) <sup>K</sup> 31	24							
25								23 <sup>H</sup>	28 <sup>H</sup>	33 <sup>H</sup>	35	37	39	40	38 <sup>K</sup> 37	35	31	23							
26								21	29 <sup>H</sup>	[34] <sup>C</sup> 37	38 <sup>H</sup> 39	40	40	[37] <sup>A</sup> 38	37	35	31	23							
27								20	27	31	34	36	38 <sup>K</sup> 39	37	36	33	29	22							
28								23	27 <sup>H</sup>	31	34	36	38 <sup>K</sup> 39	37	36	33	29	22							
29								21	28	31	34	36	38 <sup>K</sup> 39	37	36	33	29	22							
30								20	28	31	34	36	38 <sup>K</sup> 39	37	36	33	29	22							
31																									
Median							20	26	31	34	36	38	39	38	36	33	29	22							
Count							21	28	28	29	27	26	26	25	27	28	28	29	29	1					

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

TABLE 39

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

Es (Characteristic) Mc, Km April 1949  
 Observed at Washington, D. C.  
 Lat. 39.0°N, Long. 77.5°W

## IONOSPHERIC DATA

National Bureau of Standards  
 Scaled by E. J. W., J. J. S.  
 Calculated by L. H., G. P. G., J. J. S.

Calculated by L.H. G.P.G. J.J.S.																								
75°W																								
Mean Time																								
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	37/130	35/110	G	53/100	33/100	42/100	G	G	G	G	G	G	G	G	24/100	G	G
2	G	G	G	G	G	G	G	C	C	C	C	43/100	40/110	37/110	35/110	G	40/120	46/110	G	G	G	G	G	G
3	G	G	G	G	G	G	G	24/100	37/110	G	40/110	G	G	G	G	G	40/120	G	34/100	G	G	G	G	G
4	G	G	G	G	G	G	G	41/100	37/110	G	40/110	G	G	G	G	G	38/110	G	23/130	27/100	G	G	G	G
5	G	G	G	G	G	G	G	38/90	37/110	38/100	G	G	G	G	42/120	52/120	42/120	35/120	23/130	23/130	G	G	G	G
6	G	G	G	G	G	G	G	43/130	47/110	49/100	G	37/100	38/100	40/100	40/100	G	G	23/130	23/130	24/110	34/100	28/100	G	G
7	24/100	52/100	G	G	G	G	G	37/120	43/130	50/100	36/120	37/100	38/100	35/110	41/110	34/110	G	G	G	G	G	G	23/150	G
8	G	G	G	G	G	G	G	27/110	G	C	G	G	98/130	39/110	G	G	37/120	G	36/130	31/110	G	G	G	G
9	G	G	G	G	G	G	G	36/120	32/100	G	40/100	36/100	G	40/120	G	G	35/100	G	G	G	G	G	G	G
10	G	G	G	G	G	G	G	64/120	28/100	G	G	G	40/100	40/100	36/100	G	B	G	25/130	G	G	G	G	G
11	G	G	G	G	G	G	G	37/90	G	G	38/120	39/120	39/110	G	G	G	G	G	19/110	G	36/110	G	G	G
12	G	G	G	G	G	G	G	54/100	G	G	G	G	G	52/130	40/120	G	G	23/100	26/130	27/100	22/120	G	G	G
13	G	G	G	G	G	G	G	40/100	G	G	38/110	42/100	40/90	40/90	38/110	G	G	G	G	G	G	G	G	G
14	G	G	G	G	G	G	G	G	G	G	38/110	42/100	40/90	38/110	G	G	G	G	G	G	G	G	G	G
15	22/100	G	G	G	G	G	G	23/130	37/100	40/110	G	G	G	G	G	G	38/120	37/100	32/100	G	G	G	G	G
16	23/110	G	21/100	G	G	G	G	G	37/100	37/110	37/110	37/110	36/100	48/100	40/100	42/100	G	36/100	G	19/120	32/110	G	G	G
17	G	G	G	G	G	G	G	37/100	38/110	38/110	38/110	38/130	41/130	43/120	40/130	38/130	37/120	G	30/140	G	G	G	G	24/150
18	32/110	32/110	25/120	11/110	32/100	G	G	43/100	38/110	37/110	37/120	50/100	66/100	31/100	40/100	35/100	35/100	31/100	42/100	34/100	19/100	34/100	28/100	G
19	G	26/100	26/100	G	G	G	G	43/120	30/130	G	40/120	42/110	40/100	40/100	G	G	40/100	G	25/110	27/110	G	G	G	G
20	G	G	G	G	G	G	G	C	C	C	48/110	40/100	G	37/100	28/100	G	38/100	34/100	31/100	G	G	G	G	G
21	G	G	G	G	G	G	G	41/110	54/110	41/110	46/110	48/110	G	49/100	57/100	46/100	42/100	37/100	37/120	20/110	G	G	G	23/100
22	G	38/130	36/100	G	G	G	G	21/110	37/130	37/110	G	78/120	G	G	40/100	45/110	38/120	38/110	G	G	G	G	G	G
23	23/110	26/100	G	G	G	G	G	31/120	39/90	41/100	47/100	36/100	37/100	G	G	G	40/120	44/120	34/120	22/110	32/110	19/110	31/110	G
24	24/100	24/100	27/100	G	18/100	G	G	G	36/110	50/110	56/110	38/100	G	G	G	55/120	70/110	19/100	22/100	30/100	G	31/100	22/120	G
25	G	G	G	G	G	G	G	G	37/110	48/110	G	G	G	G	G	G	G	G	G	19/110	G	G	G	G
26	G	G	G	G	G	G	G	25/120	38/130	38/130	G	G	G	G	48/100	G	G	49/100	44/100	48/100	34/100	38/100	38/110	G
27	G	G	G	G	G	G	G	24/90	31/130	G	G	G	43/110	G	G	G	G	G	47/110	35/100	G	38/100	G	G
28	G	G	G	G	G	G	G	32/140	G	34/120	52/110	52/100	G	G	G	G	43/110	38/110	35/110	31/110	33/110	37/110	G	G
29	G	23/130	24/130	27/130	27/130	27/130	36/120	41/120	41/120	49/110	49/100	43/100	43/100	G	44/100	C	C	G	19/100	18/100	G	C	G	G
30	G	28/130	28/130	32/120	33/130	33/130	43/130	43/120	40/110	40/120	37/120	G	G	G	G	G	G	G	G	G	G	G	G	G
31																								
Median	**	**	**	**	**	**	**	36	37	38	37	34	36	**	32	**	**	**	20	19	**	**	**	**
Count	30	29	29	29	29	29	29	28	27	28	30	30	30	30	30	30	27	28	29	30	30	29	30	30

\*\* MEDIAN FES LESS THAN MEDIAN 10E, OR LESS  
 THAN LOWER FREQUENCY LIMIT OF RECORDER.

Sweep 1.0 Mc to 25.0 Mc in 0.25 min  
 Manual ☐ Automatic ☒



TABLE 41

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

(M3000)F2

(Characteristic)

April 1949

(Month)

Washington, D. C.

(Unit)

## IONOSPHERIC DATA

National Bureau of Standards

(Institution)

Scoted by: E.J.W., J.J.S., J.M.C.

Calculated by: L.H., J.J.S., G.P.G.

75°W

Mean Time

Lat 39.0°N, Long 77.5°W

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	(29) <sup>1</sup>	(28) <sup>1</sup>	(28) <sup>1</sup>	(28) <sup>1</sup>	(29) <sup>1</sup>	(29) <sup>1</sup>	(31) <sup>1</sup>	(31) <sup>1</sup>	30	30	29	29	29	29	(29) <sup>1</sup>	28	(30) <sup>1</sup>	(29) <sup>1</sup>	(30) <sup>1</sup>	(31) <sup>1</sup>	(28) <sup>1</sup>	28	28	29
2	29	28	29	(28) <sup>1</sup>	27	27	(30) <sup>1</sup>	C	C	C	30	29	28	29	28	29	29	(29) <sup>1</sup>	30	(30) <sup>1</sup>	29	28	29	(28) <sup>1</sup>
3	(29) <sup>1</sup>	(28) <sup>1</sup>	26	26	27	28	31	31	(31) <sup>1</sup>	30	29	29	28	28	28	(28) <sup>1</sup>	28	(29) <sup>1</sup>	(29) <sup>1</sup>	(30) <sup>1</sup>	29	29	29	(27) <sup>1</sup>
4	(28) <sup>1</sup>	(28) <sup>1</sup>	26	26	25	27	30	31	31	30	(30) <sup>1</sup>	29	28	31	28	28	28	29	29	(30) <sup>1</sup>	27	(29) <sup>1</sup>	(28) <sup>1</sup>	28
5	(29) <sup>1</sup>	(29) <sup>1</sup>	(28) <sup>1</sup>	28	26	27	28	30	(31) <sup>1</sup>	29	30	30	28	(28) <sup>1</sup>	28	28	29	(29) <sup>1</sup>	(30) <sup>1</sup>	(30) <sup>1</sup>	29	(30) <sup>1</sup>	27	(28) <sup>1</sup>
6	(29) <sup>1</sup>	(28) <sup>1</sup>	(28) <sup>1</sup>	28	(28) <sup>1</sup>	28	30	30	31	29	30	30	29	28	28	29	28	29	(29) <sup>1</sup>	(30) <sup>1</sup>	29	28	27	28
7	30	29	28	27	27	27	30	31	32	30	28	28	28	27	28	27	27	(29) <sup>1</sup>	(29) <sup>1</sup>	(29) <sup>1</sup>	(27) <sup>1</sup>	(27) <sup>1</sup>	(27) <sup>1</sup>	(27) <sup>1</sup>
8	(29) <sup>1</sup>	(28) <sup>1</sup>	(28) <sup>1</sup>	28	28	28	28	30	30	30	28	28	28	27	28	27	27	28	28	(29) <sup>1</sup>	(27) <sup>1</sup>	(27) <sup>1</sup>	(27) <sup>1</sup>	(27) <sup>1</sup>
9	(29) <sup>1</sup>	(28) <sup>1</sup>	(28) <sup>1</sup>	28	28	28	28	30	30	30	28	28	28	27	28	27	27	28	28	(29) <sup>1</sup>	(27) <sup>1</sup>	(27) <sup>1</sup>	(27) <sup>1</sup>	(27) <sup>1</sup>
10	24	(24) <sup>1</sup>	25	(26) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>	(25) <sup>1</sup>
11	26	26	26	27	26	27	27	29	30	31	29	29	29	28	27	27	28	(28) <sup>1</sup>	(29) <sup>1</sup>	(29) <sup>1</sup>	28	27	(27) <sup>1</sup>	26
12	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>
13	23	26	26	(26) <sup>1</sup>	26	25	(26) <sup>1</sup>	26	(31) <sup>1</sup>	(29) <sup>1</sup>	29	29	29	29	28	(28) <sup>1</sup>	(28) <sup>1</sup>	(28) <sup>1</sup>	(28) <sup>1</sup>	(28) <sup>1</sup>	28	28	(26) <sup>1</sup>	26
14	26	28	26	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	(26) <sup>1</sup>	30	29	28	27	28	28	29	28	29	29	(30) <sup>1</sup>	(30) <sup>1</sup>	(30) <sup>1</sup>	(30) <sup>1</sup>	(30) <sup>1</sup>	(30) <sup>1</sup>	(30) <sup>1</sup>
15	(28) <sup>1</sup>	(27) <sup>1</sup>	29	27	27	27	31	30	(30) <sup>1</sup>	29	29	29	29	29	29	28	(28) <sup>1</sup>	(29) <sup>1</sup>	(29) <sup>1</sup>	(29) <sup>1</sup>	28	(27) <sup>1</sup>	28	28
16	27	27	27	28	27	28	(30) <sup>1</sup>	31	30	30	28	28	28	28	(29) <sup>1</sup>	29	29	(29) <sup>1</sup>	(29) <sup>1</sup>	(29) <sup>1</sup>	28	(27) <sup>1</sup>	25	26
17	25	26	27	26	26	26	30	32	29	29	27	29	28	28	28	28	28	29	(29) <sup>1</sup>	(29) <sup>1</sup>	26	25	(26) <sup>1</sup>	26
18	26	28	28	29	28	28	31	30	31	29	28	28	28	(27) <sup>1</sup>	(28) <sup>1</sup>	27	(27) <sup>1</sup>	28	(31) <sup>1</sup>	30	29	(27) <sup>1</sup>	27	27
19	27	26	27	(26) <sup>1</sup>	26	26	29	(33) <sup>1</sup>	(29) <sup>1</sup>	(27) <sup>1</sup>	26	26	26	28	26	26	26	26	28	29	27	27	26	25
20	25	C	C	C	C	C	C	C	C	29	29	27	27	27	27	27	(28) <sup>1</sup>	(29) <sup>1</sup>	(29) <sup>1</sup>	23	28	28	27	27
21	26	27	26	(27) <sup>1</sup>	27	28	30	30	30	29	28	28	28	27	26	27	28	28	(28) <sup>1</sup>	(28) <sup>1</sup>	28	28	(29) <sup>1</sup>	26
22	27	26	26	28	28	28	30	30	30	28	28	28	27	27	27	27	27	(29) <sup>1</sup>	(29) <sup>1</sup>	(29) <sup>1</sup>	27	27	26	26
23	(26) <sup>1</sup>	26	25	25	25	25	27	(28) <sup>1</sup>	28	29	28	27	27	26	26	27	27	28	28	28	27	27	26	26
24	26	28	26	26	26	28	31	29	30	29	28	28	28	27	27	28	27	28	(28) <sup>1</sup>	(28) <sup>1</sup>	27	27	28	27
25	27	26	27	27	26	28	30	30	30	29	30	27	28	27	27	27	(28) <sup>1</sup>	(28) <sup>1</sup>	(28) <sup>1</sup>	(28) <sup>1</sup>	27	27	(27) <sup>1</sup>	26
26	26	27	26	25	27	(26) <sup>1</sup>	29	(29) <sup>1</sup>	C	29	29	28	27	27	28	27	28	(30) <sup>1</sup>	31	30	29	(26) <sup>1</sup>	27	(25) <sup>1</sup>
27	25	25	(27) <sup>1</sup>	25	27	(27) <sup>1</sup>	28	28	28	29	28	27	27	27	27	27	(27) <sup>1</sup>	28	(29) <sup>1</sup>	30	29	27	27	26
28	26	(25) <sup>1</sup>	25	25	23	26	30	29	27	27	27	27	27	26	26	26	26	28	29	28	28	26	26	26
29	26	26	26	27	27	28	31	29	30	28	28	27	28	26	25	C	C	28	(27) <sup>1</sup>	(28) <sup>1</sup>	26	C	28	(27) <sup>1</sup>
30	29	29	26	27	(26) <sup>1</sup>	27	30	29	31	28	29	27	28	27	28	28	28	27	27	28	28	28	28	(30) <sup>1</sup>
31																								
Median	26	27	26	26	27	27	30	30	30	29	28	28	28	27	28	27	28	28	(29)	(29)	28	27	27	26
Count	30	29	29	29	29	29	29	28	27	28	30	30	30	30	30	29	29	30	29	29	29	29	30	30

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

TABLE 42  
IONOSPHERIC DATA

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D C

Form adopted June 54E

(M3000)F1  
(Characteristics)  
Observed at

April 1949  
(Month)

(Unit)  
Washington, D.C.

Lat 39.0°N

Long 77.5°W

National Bureau of Standards

Scaled by E.J.W., J.J.S., J.M.C.

Calculated by J.J.S., L.H., G.P.G.

Calculated by JJS, LH, GPG																								
75°W																								
Mean Time																								
Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1									Q	Q	L	L	Q	L	L	Q	Q	Q						
2									C	C	Q	L	L	Q	L	L	L	Q						
3									Q	Q	L	L	Q	Q	Q	Q	Q	Q						
4									Q	Q	L	L	Q	Q	L	Q	Q	Q						
5									Q	Q	Q	L	L	Q	Q	Q	Q	Q						
6									Q	Q	Q	41	38	L	Q	Q	Q	Q						
7									L	Q	L	Q	L	Q	Q	Q	Q	Q						
8									34 <sup>K</sup>	C <sup>K</sup>	46 <sup>K</sup>	41 <sup>K</sup>	35 <sup>K</sup>	35 <sup>K</sup>	35 <sup>K</sup>	34 <sup>K</sup>	34 <sup>K</sup>	32 <sup>K</sup>						
9									Q <sup>K</sup>	45 <sup>K</sup>	39 <sup>K</sup>	41 <sup>K</sup>	33 <sup>K</sup>	32 <sup>K</sup>	L <sup>K</sup>	L	Q	Q						
10									Q	L	L	L	Q	L	L	L	B	B						
11									Q	L	39 <sup>K</sup>	L	L	L	Q	Q	Q	Q						
12									Q <sup>K</sup>	31 <sup>K</sup>	32 <sup>K</sup>	35 <sup>K</sup>	34 <sup>K</sup>	34 <sup>K</sup>	31 <sup>K</sup>	32 <sup>K</sup>	32 <sup>K</sup>	Q <sup>K</sup>						
13									Q	Q	L	Q	Q	L	Q	Q	Q	Q						
14									Q	L	L	L	L	Q	L	L	Q	Q						
15									L	L	L	L	L	L	Q	L	L	Q						
16									Q	40	Q	Q	L	L	Q	Q	L	Q						
17									Q	38	L	L	35	L	L	Q	L	Q						
18									Q	Q	34	36	34	38	35	Q	Q	Q						
19									34 <sup>K</sup>	35 <sup>K</sup>	35 <sup>K</sup>	34 <sup>K</sup>	36 <sup>K</sup>	34 <sup>K</sup>	34 <sup>K</sup>	32 <sup>K</sup>	32 <sup>K</sup>	L <sup>K</sup>						
20									C	L	L	42	L	35	L	L	Q	Q						
21									L	Q	L	Q	L	L	L	Q	Q	Q						
22									Q	Q	Q	L	L	34	L	Q	Q	Q						
23									Q	L	34	33	33	33	31	29	Q	Q						
24									Q	Q	Q	34	L	L	33	L	Q	Q						
25									Q	Q	(36) <sup>S</sup>	L	L	L	33	L	Q	Q						
26									Q	Q	L	L	L	L	Q	L	Q	Q						
27									Q	L	L	Q	33	40	34	L	Q	Q						
28									Q	L	31	35	33	L	32	Q	Q	Q						
29									Q	L	L	A	33	36	L	C	C	Q						
30									Q	Q	Q	36	L	33	L	L	Q	Q						
31																								
Median									-	38	36	36	34	34	34	-	-	-						
Count									2	5	10	10	12	12	8	4	3	1						

Sweep 1.0 Mc to 25.0 Mc in 0.25 min

Manual ☐ Automatic ☒

TABLE 43

Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

National Bureau of Standards

(Institution)

Scaled by E. J. W. J. J. S. J. M. C.

Calculated by: J. J. S. L. H. G. P. G.

(M1500)E

(Characteristics)

April 1949

(Month)

Observed at Washington, D. C.

Lat. 39.0°N, Long. 77.5°W

75°W Mean Time

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
2							C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
4							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
5							3.7	4.1	3.9	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
6							5.0	4.0	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
7							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
8							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
9							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
10							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
11							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
12							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
13							3.7	3.9	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
14							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
15							4.1	3.9	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
16							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
17							3.7	4.0	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
18							4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
19							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
20							C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
21							A	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
22							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
23							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
24							4.1	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
25							3.9	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
26							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
27							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
28							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
29							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
30							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
31							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Median							4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Count							20	28	26	28	25	24	22	25	25	28	26	27	29					

Sweep 1.0 Mc to 25.0 Mc in 0.05 min

Manual ☐ Automatic ☒

Table 44

Ionospheric Storminess at Washington, D. C.April 1949

Day	Ionospheric character*		Principal storms		Geomagnetic character**	
	00-12 GCT	12-24 GCT	Beginning GCT	End GCT	00-12 GCT	12-24 GCT
1	1	1			1	2
2	1	2			1	1
3	1	1			2	2
4	1	3			2	1
5	1	1			1	2
6	1	1			2	1
7	0	1			1	4
8	7	8	0100	----	6	4
9	4	2	----	1000	2	2
10	3	4	1100	2000	4	4
11	2	1			4	4
12	3	6	0700	----	3	4
13	4	2	----	0900	4	3
14	2	2			4	2
15	1	2			3	2
16	1	3			3	3
17	2	2			3	2
18	1	1			2	1
19	2	5	1100	----	2	1
20	***	1	----	---#	1	1
21	2	2			2	2
22	1	3			1	1
23	2	2			1	1
24	2	0			2	2
25	1	1			2	1
26	2	3			2	2
27	2	1			3	1
28	2	1			2	2
29	2	1			1	2
30	1	3			1	1

\*Ionosphere character figure (I-figure) for ionospheric storminess at Washington, D. C., during 12-hour period, on an arbitrary scale of 0 to 9, 9 representing the greatest disturbance.

\*\*Average for 12 hours of Cheltenham, Maryland, geomagnetic K-figures on an arbitrary scale of 0 to 9, 9 representing the greatest disturbance.

\*\*\*No readable record. Refer to table 33 for detailed explanation.

----Dashes indicate continuing storm.

#Time of ending unknown because of loss of record.

Table 45

Sudden Ionosphere Disturbances Observed at Washington, D. C.April 1949

1949 Day	GCT		Location of transmitters	Relative intensity at minimum*	Other phenomena
	Beginning	End			
April					
5	0953	1018	England	0.03	
5	1020	1045	England	0.05	
5	1522	1545	Ohio, D.C., England	0.03	
5	1622	1710	Ohio, D.C., England, New Brunswick	0.0	
10	2058	2245	Ohio, D.C., England	0.0	
19	2050	2120	Ohio, D.C.	0.1	
20	1339	1415	D.C., England	0.3	Solar flare** 1350
21	1212	1315	England	0.1	
25	2059	2135	Ohio, D.C.	0.2	
27	1755	1805	Ohio, D.C.	0.2	Solar flare** 1750
27	2143	2200	Ohio, D.C., New Brunswick	0.05	
28	1753	1810	Ohio, D.C.	0.2	Solar flare** 1755
29	1640	1800	Ohio, D.C., England New Brunswick	0.1	

\*Ratio of received field intensity during SID to average field intensity before and after, for station WEXAL, 6080 kilocycles, 600 kilometers distant, for all SID except the following: Station GLH, 13525 kilocycles, received in New York, 5340 kilometers distant, was used for the SID on April 5 at 0953 and at 1020, on April 20, and on April 21.

\*\*Time of observation at McMath-Hulbert Observatory, Michigan.

Sudden Ionosphere Disturbances Reported by Engineer-in-Chief, Cable and Wireless, Ltd., as Observed in England

1949 Day	GCT		Receiving station	Location of transmitters	Other phenomena	1949 Day	GCT		Receiving station	Location of transmitters	Other phenomena
	Beginning	End					Beginning	End			
March 21	0750	0820	Brentwood	Bahrain I., Belgian Congo, French Equatorial Africa, Greece, India, Iran, Kenya, Madagascar, Palestine, Syria, Trans-Jordan, U.S.S.R., Yugoslavia		April 5	0955	1025	Somerton	Aden, Argentina, Ascension I., Australia, Brazil, Ceylon, China, Egypt, Gold Coast, India, Union of S. Africa	
21	0748	0810	Somerton	Aden, Ascension I., Ceylon, China, Union of S. Africa		5	1028	1055	Brentwood	Afghanistan, Austria, Belgian Congo, Bulgaria, Canary Is., Greece, India, Iran, Kenya, Madagascar, Palestine, Portugal, Southern Rhodesia, Spain, Syria, Trans-Jordan, Turkey, U.S.S.R., Zanzibar	
25	0640	0710	Brentwood	India, Kenya, Palestine, Southern Rhodesia		5	1025	1050	Somerton	Aden, Ascension I., Argentina, Australia, Brazil, Ceylon, China, Egypt, Gold Coast, India, Union of S. Africa	
26	1420	1445	Brentwood	Austria, Bahrain I., Belgian Congo, Canary Is., Chile, Eritrea, Greece, India, Iran, Malta, Palestine, Portugal, Spain, Switzerland, Syria, Thailand, Turkey, U.S.S.R., Venezuela, Yugoslavia, Zanzibar	Solar flare* L424 Solar flare** L427	5	1520	1545	Brentwood	Colombia, Uruguay, Venezuela	
26	1420	1440	Somerton	Aden, Argentina, Ascension I., Australia, Barbados, Brazil, Canada, Ceylon, China, Egypt, Gold Coast, India, New York, Union of S. Africa	Solar flare* L424 Solar flare** L427	5	1640	1725	Brentwood	Barbados, Chile, Colombia, Uruguay, Venezuela	
28	0948	1005	Brentwood	Afghanistan, Austria, Bahrain I., Belgian Congo, Canary Is., Greece, India, Kenya, Palestine, Portugal, Southern Rhodesia, Spain, Switzerland, Syria, Trans-Jordan, U.S.S.R., Yugoslavia, Zanzibar		5	1642	1710	Somerton	Argentina, Brazil, Canada, New York	
28	0945	1015	Somerton	Aden, Ascension I., Ceylon, India, Union of S. Africa		10	0607	0625	Brentwood	India, Kenya, Palestine, Southern Rhodesia, U.S.S.R.	
29	0555	0610	Brentwood	Afghanistan, Greece, India, Iran, Kenya, Southern Rhodesia, Syria, U.S.S.R.		11	1101	1130	Brentwood	Belgian Congo, Greece, India, Palestine, Southern Rhodesia, Spain, Trans-Jordan, Zanzibar	
30	0645	0710	Brentwood	Afghanistan, Bahrain I., India, Syria		13	0802	0825	Brentwood	Austria, Bahrain I., Belgian Congo, Eritrea, Greece, India, Iran, Kenya, Madagascar, Palestine, Southern Rhodesia, Spain, Syria, Trans-Jordan, Yugoslavia, Zanzibar	Solar flare** 0803
31	1730	1810	Brentwood	Chile, Colombia, Uruguay, Venezuela		13	0805	0825	Somerton	Aden, Argentina, Ceylon, China, India, Union of S. Africa	Solar flare** 0803
31	1740	1755	Somerton	Argentina, Barbados, Brazil, Canada, New York		13	1157	1215	Brentwood	Austria, Belgian Congo, Greece, Iran, Madagascar, Palestine, Portugal, Southern Rhodesia, Spain, Syria, Switzerland, Yugoslavia, Zanzibar	
April 5	0857	***	Brentwood	Afghanistan, Austria, Bahrain I., Belgian Congo, Bulgaria, Canary Is., Greece, India, Iran, Kenya, Madagascar, Palestine, Portugal, Southern Rhodesia, Spain, Switzerland, Syria, Trans-Jordan, Turkey, U.S.S.R., Yugoslavia, Zanzibar							

\*Time of observation at Prague Observatory, Czechoslovakia.

\*\*Time of observation at Meudon Observatory, France.

\*\*\*Incomplete recovery of SID.

Table 47

Sudden Ionosphere Disturbances Reported by Chinese Government Radio Administration  
as Observed at Shanghai, China

1949 Day	GCT		Location of transmitters	Other phenomena
	Beginning	End		
January				
15	0420	0440	Australia, California, French Indo-China, India, Philippine Is., Soviet Union in Asia, Thailand	
16	0530	0545	Australia, French Indo-China, India, Thailand	
23	0110	**	Australia, California, India, Philippine Is., Thailand	
25	0254	0310	Australia, California, French Indo-China, India, Philippine Is., Soviet Union in Asia, Thailand	
February				
10	0230	0250	California, French Indo-China, India, Philippine Is., Soviet Union of Asia, Thailand	
11	1105	1120	Argentina, India	Solar flare* 1100
18	0225	0250	Argentina, Australia, California, French Indo-China, India, Philippine Is., Soviet Union in Asia, Thailand	
March				
21	0750	0820	Australia, California, India, Thailand	

\*Time of observation at Meudon Observatory, France.

\*\*Time not reported.

Table 48

Sudden Ionosphere Disturbances Reported by RCA Communications, Inc.,  
as Observed at Point Reyes, California

1949 Day	GCT		Location of transmitters
	Beginning	End	
April			
6	0030	0100	Australia, China, Hawaii, Japan, Java, Philippine Is.
10-11	2106	0030	Australia, China, Hawaii, Japan, Philippine Is.
28	0440	0530	China, Chosen, Japan, Philippine Is.

**Note:** Observers are invited to send to the CRPL information on times of beginning and end of sudden ionosphere disturbances for publication as above. Address letters to the Central Radio Propagation Laboratory, National Bureau of Standards, Washington 25, D. C.

Table 49

**Provisional Radio Propagation Quality Figures**  
(Including Comparisons with CRPL Warnings and CRPL Probable Disturbed Period Forecasts)  
March 1949

Day	North Atlantic				North Pacific			
	Quality figure	CRPL <sup>a</sup> Warning	CRPL Forecast of probable disturbed periods	Geo-magnetic K <sub>Ch</sub>	Quality figure	CRPL <sup>a</sup> Warning	CRPL Forecast of probable disturbed periods	Geo-magnetic K <sub>Ch</sub>
	01-12 OCT 13-24 OCT	01-12 OCT 13-24 OCT		01-12 OCT 13-24 OCT	01-12 OCT 13-24 OCT	01-12 OCT 13-24 OCT		01-12 OCT 13-24 OCT
1	6 6			2 3	6 6			2 3
2	5 6		X	4 2	5 6		X	4 2
3	5 6		X	4 3	5 5		X	4 3
4	5 6			2 2	5 7			2 2
5	6 7		X	3 1	5 6		X	3 1
6	7 6		X	1 1	6 7		X	1 1
7	7 6			1 1	5 7			1 1
8	7 7			1 2	6 7			1 2
9	7 6			2 3	6 6			2 3
10	7 6			0 1	6 6			0 1
11	7 7			1 1	6 7			1 1
12	6 7			1 2	6 6			1 2
13	6 6			3 4	6 6			3 4
14	(4) 5	X		5 3	7 6	X		5 3
15	5 6	X		4 2	7 6	X		4 2
16	6 6			2 4	7 7			2 4
17	6 6	X		3 4	7 5	X		3 4
18	(4) 5			4 3	6 5			4 3
19	6 6			3 3	7 7			3 3
20	6 7		X	2 2	7 6		X	2 2
21	6 5		X	3 3	6 6		X	3 3
22	(3)(4)	X X	X	6 4	5 5	X X	X	6 4
23	(4) 5	X X	X	5 2	5 6	X X	X	5 2
24	5 6			2 2	6 7			2 2
25	6 6			2 2	6 6			2 2
26	6 6			4 1	5 5			4 1
27	7 6			0 1	6 6			0 1
28	7 7			3 3	6 6			3 3
29	6 7			3 2	5 7			3 2
30	6 7			3 1	6 6			3 1
31	7 6			2 1	6 7			2 1
Score:								
H		2	2			0	0	
M		2	2			0	0	
G		25	21			26	23	
(S)		1	3			2	5	
S		1	3			3	3	

Quality Figure Scale:

- 1 - Useless
- 2 - Very poor
- 3 - Poor
- 4 - Poor to fair
- 5 - Fair
- 6 - Fair to good
- 7 - Good
- 8 - Very good
- 9 - Excellent

Symbols:

- X Warning given or probable disturbed date
- H Quality 4 or worse on day or half day of warning
- M Quality 4 or worse on day or half day of no warning
- G Quality 5 or better on day of no warning
- (S) Quality 5 on day of warning
- S Quality 6 or better on day of warning
- ( ) Quality 4 or worse (disturbed)

Geomagnetic K<sub>Ch</sub> on the standard scale of 0 to 9, 9 representing the greatest disturbance.

<sup>a</sup>Broadcast on WWV, Washington, D.C. Times of warnings recorded to nearest half day as broadcast.

Table 50a

Coronal observations at Climax, Colorado (5303A), east limb

Date GCT	Degrees north of the solar equator															0°	Degrees south of the solar equator																				
	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20		15	10	5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	
1949 Apr. 4.7	-	-	-	-	-	-	3	4	4	3	6	11	13	17	20	23	24	18	20	18	20	19	20	16	12	7	5	4	4	5	2	-	-	-	-	-	-
5.6	-	-	-	-	-	-	-	-	-	5	5	12	13	14	17	19	18	16	18	18	17	12	13	12	12	7	7	6	4	-	-	-	-	-	-	-	-
6.7	-	-	-	-	-	-	-	-	-	3	4	6	5	10	13	15	16	15	14	10	13	12	11	10	9	7	6	3	-	-	-	-	-	-	-	-	
7.9	-	-	-	-	-	-	-	-	-	4	5	7	10	12	16	18	19	19	10	12	16	16	11	10	8	5	6	6	3	-	-	-	-	-	-	-	
9.9	X	X	X	X	X	X	X	X	X	X	X	14	14	14	15	13	14	13	9	8	10	13	14	14	12	12	11	8	6	5	4	3	X	X	X	X	
11.7	-	-	-	-	-	-	-	-	-	3	6	8	4	5	9	3	4	7	7	8	8	16	16	15	15	11	5	4	-	-	-	-	-	-	-	-	
12.9	X	X	X	X	X	X	-	-	-	3	6	5	5	6	4	5	8	7	7	6	8	10	9	7	6	6	X	X	X	X	X	X	X	X	X	X	
15.6	-	-	-	-	-	-	-	-	-	3	5	5	4	7	9	10	12	18	20	20	19	15	11	9	8	8	8	7	5	3	4	4	3	3	2	-	-
16.6	-	-	-	-	-	-	3	5	6	7	7	5	14	15	16	20	22	23	23	16	14	14	10	7	6	4	5	5	5	3	6	5	4	4	-	-	
17.7	-	-	-	-	-	-	-	-	3	3	4	4	5	10	13	14	15	22	20	20	15	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
19.6	-	-	-	-	-	3	4	4	5	6	7	9	10	10	15	17	24	30	26	25	27	22	18	7	5	4	4	3	3	2	-	-	-	2	2	-	
21.6	-	-	-	2	2	3	3	3	3	4	6	9	8	6	10	20	23	24	17	18	19	19	14	15	8	7	5	3	2	2	2	-	-	-	-	-	
22.6	X	X	X	-	2	3	3	3	3	2	5	6	6	8	12	15	16	16	12	10	10	9	7	5	3	3	2	2	-	-	-	-	-	X	X	X	
23.6	-	-	-	-	2	3	4	2	5	6	9	9	11	16	24	22	26	20	14	14	13	9	10	11	10	6	4	3	-	-	-	-	-	-	-	-	
24.6	-	-	-	-	-	-	-	-	-	-	3	4	12	20	20	20	20	18	10	9	8	7	15	14	12	7	3	3	-	-	-	-	-	-	-	-	
28.6	-	-	-	-	-	3	3	3	3	4	5	7	10	12	18	21	21	11	10	10	10	9	14	13	9	7	3	3	-	-	-	-	-	-	-	-	
29.9	-	-	-	-	-	-	-	-	-	-	-	-	6	12	15	14	12	8	7	7	6	6	5	5	4	2	-	-	-	-	-	-	-	-	-		
30.6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	18	17	17	16	15	10	5	5	4	3	-	-	-	-	-	

Table 51a

Coronal observations at Climax, Colorado (6374A), east limb

Date GCT	Degrees north of the solar equator																			0°	Degrees south of the solar equator																		
	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5	5		10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90		
1949																																							
Apr. 4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	8	4	3	4	1	11	8	7	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	
5.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	5	4	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	
6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	7	5	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7.9	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	4	2	1	2	8	13	5	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	
9.9	X	X	X	X	X	X	X	X	X	X	X	-	-	2	6	6	11	2	2	5	5	3	1	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	
11.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	1	1	1	2	3	3	2	5	1	-	-	-	X	X	X	X	X	X	X	X	X		
12.9	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	1	2	3	3	2	1	-	-	X	X	X	X	X	X	X	X	X	X	X		
15.6	1	1	1	1	1	1	1	1	1	-	-	-	-	2	5	7	3	6	3	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
16.6	2	2	2	2	2	2	1	1	-	-	-	-	-	-	1	5	10	10	12	3	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
17.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4	5	7	1	1	7	5	3	3	1	-	-	-	-	-	-	-	-	-	-	-	-		
19.6	1	1	2	2	2	1	1	1	-	-	-	-	-	-	4	4	5	3	1	1	8	8	7	4	-	-	-	-	-	-	-	-	-	-	-	-	-		
21.6	1	1	1	1	1	1	-	-	-	-	-	-	-	1	1	3	3	4	3	1	7	6	2	1	-	-	1	1	1	1	1	-	-	-	-	-	1		
22.6	X	X	X	-	-	-	-	-	-	-	-	-	-	2	2	3	3	12	2	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X		
23.6	1	2	2	3	3	-	-	-	-	-	-	-	-	6	7	8	9	14	15	6	4	1	1	1	2	2	2	1	1	-	-	-	-	-	-	-	-		
24.6	1	-	-	-	-	-	-	-	-	-	-	-	-	1	5	10	13	13	10	1	-	-	2	2	4	5	3	1	1	-	-	-	-	-	-	-	-		
28.6	1	1	1	1	1	1	-	-	-	-	-	-	-	1	4	9	17	7	2	1	1	3	5	-	-	-	1	1	2	2	-	-	-	-	-	-	-		
29.9	-	-	-	-	-	-	-	-	-	-	-	-	-	1	6	7	8	5	6	5	5	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
30.6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	6	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-		

Table 52a

Coronal observations at Climax, Colorado (6704A), east limb

Date GCT	Degrees north of the solar equator															0°	Degrees south of the solar equator																					
	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20		15	10	5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
1949 Apr. 4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	1	2	3	3	3	3	3	2	2	1	-	-	-	-	-	-	-	-	-	
5.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	2	2	2	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-	
6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	
7.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	2	2	2	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9.9	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-	X	X	X	X	
11.7	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	
12.9	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	
15.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
16.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	2	3	3	2	2	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	
17.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	2	2	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	
19.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	4	4	5	4	3	3	3	2	1	-	-	-	-	-	-	-	-	-	-	-	
21.6	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	2	3	4	4	4	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
22.6	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-	-	-	-	-	-	X	X	X	
23.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	2	2	2	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	
24.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	
26.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
29.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
30.6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

11-10-24

Coron 2 observations at Climax Colorado 15303A

[illegible]

Table 51b

General observations at Climax, 6 1 1961

[illegible]

Table 20

Date	Degrees south of the solar equator															Degree north of the solar equator																							
GCT	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90		
1949																																							
Apr. 4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9.9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
11.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
12.9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
15.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
16.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
17.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
19.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
21.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
22.6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
23.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
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30.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Table 53

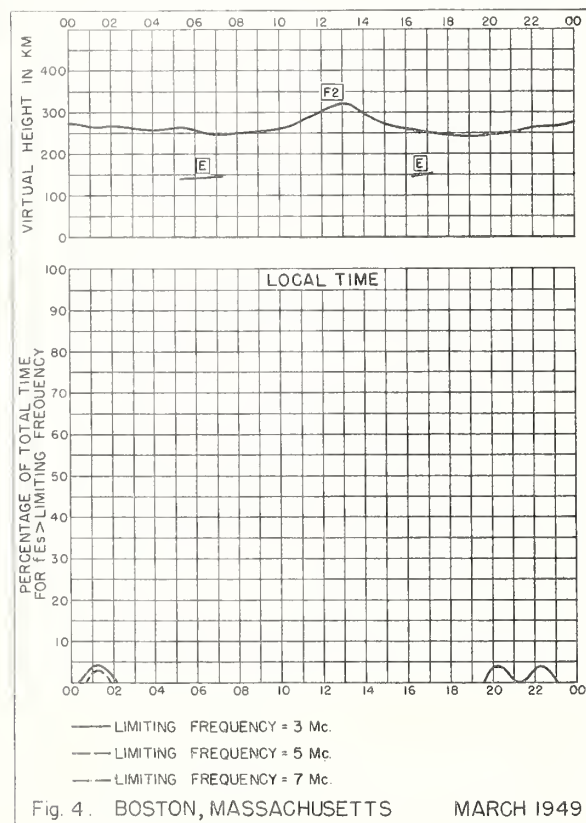
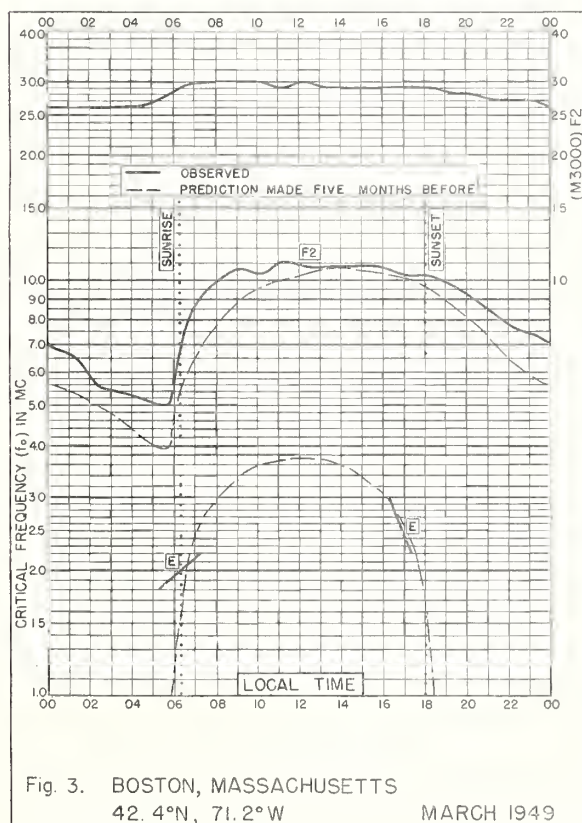
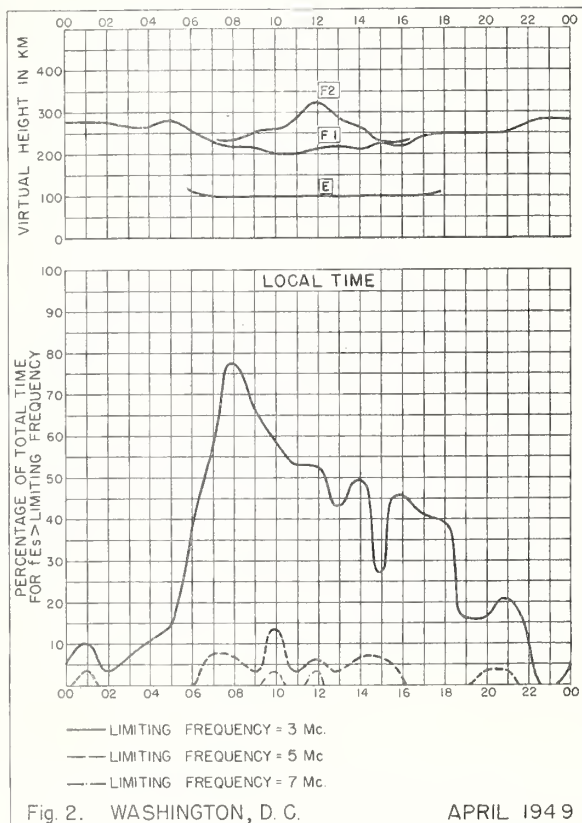
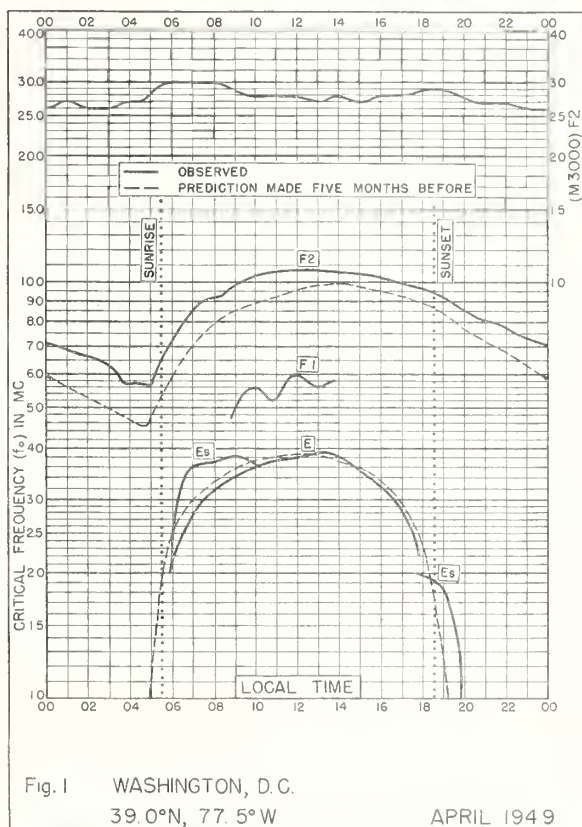
American and Zürich Provisional Relative Sunspot NumbersApril 1949

Date	R <sub>A</sub> *	R <sub>Z</sub> **	Date	R <sub>A</sub> *	R <sub>Z</sub> **
1	175	149	17	189	175
2	201	158	18	188	164
3	210	155	19	181	168
4	240	178	20	199	165
5	217	176	21	221	162
6	211	147	22	226	155
7	201	149	23	206	177
8	199	151	24	202	185
9	170	144	25	215	177
10	164	139	26	186	141
11	163	104	27	198	110
12	184	128	28	169	122
13	174	138	29	156	116
14	190	151	30	136	81
15	181	164			
16	169	138	Mean:	190.7	148.9

\*Combination of reports from 45 observers; see page 8.

\*\*Dependent on observations at Zürich Observatory and its stations at Locarno and Arosa.

## GRAPHS OF IONOSPHERIC DATA



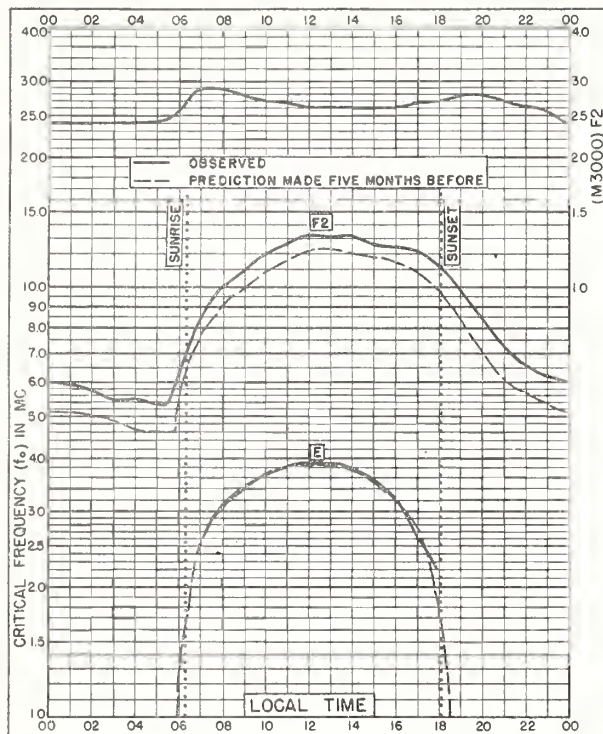


Fig. 5. SAN FRANCISCO, CALIFORNIA  
37.4°N, 122.2°W MARCH 1949

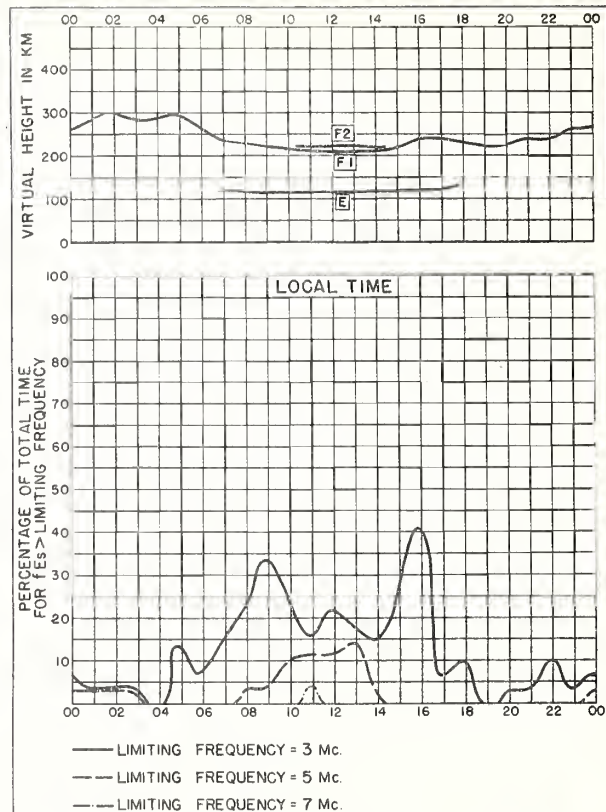


Fig. 6. SAN FRANCISCO, CALIFORNIA MARCH 1949

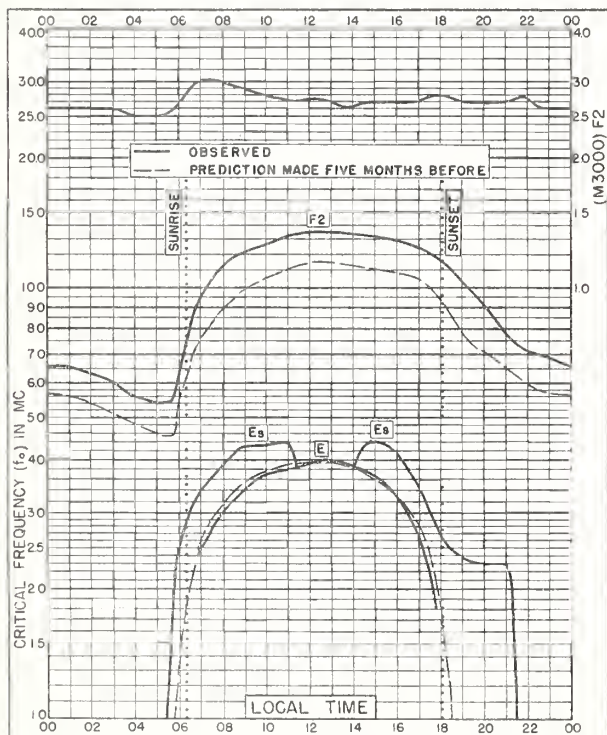


Fig. 7. WHITE SANDS, NEW MEXICO  
32.3°N, 106.5°W MARCH 1949

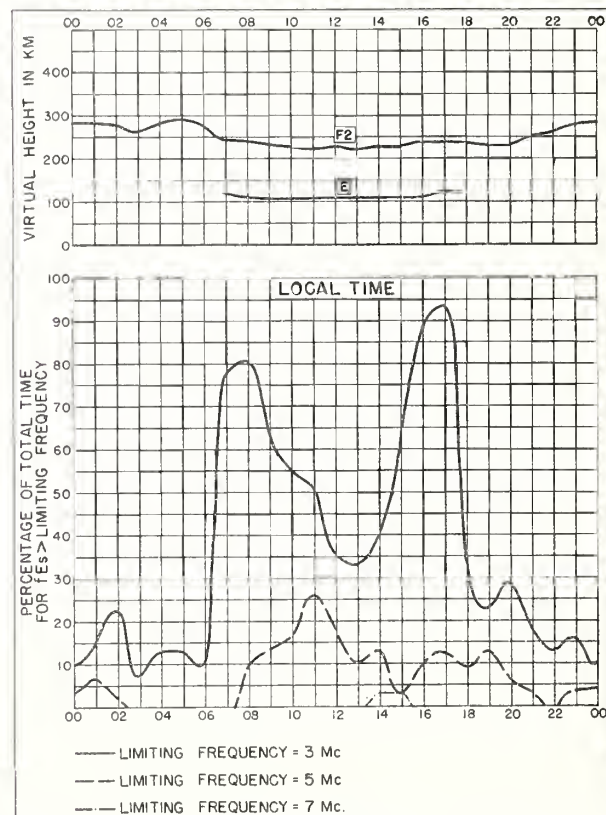


Fig. 8. WHITE SANDS, NEW MEXICO MARCH 1949

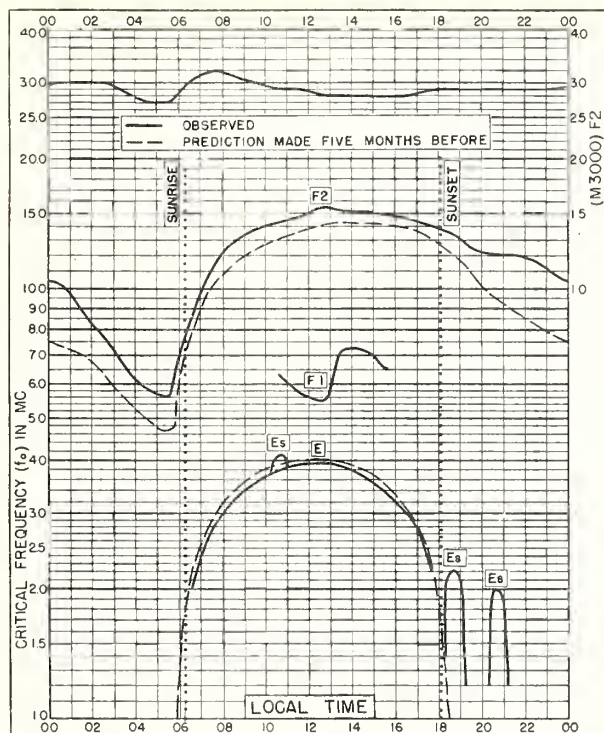


Fig. 9. WUCHANG, CHINA  
30.6°N, 114.4°E

MARCH 1949

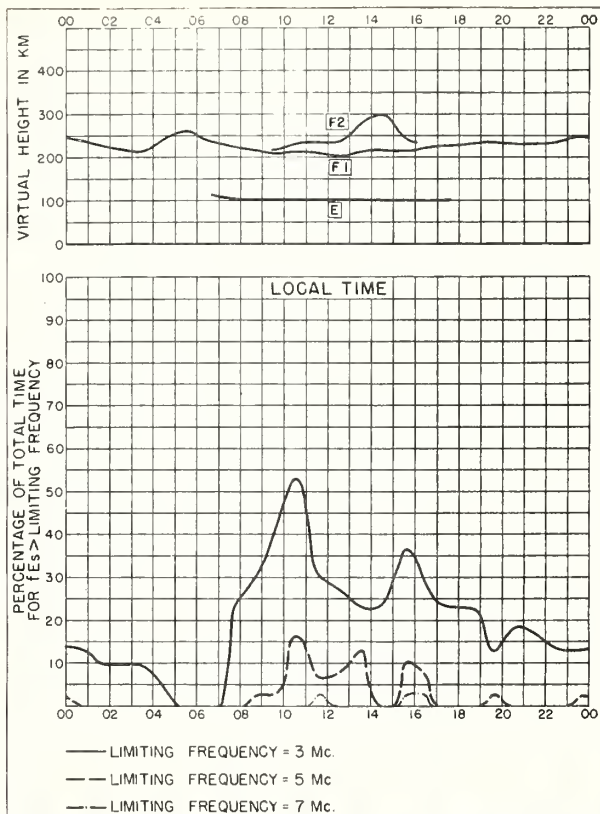


Fig. 10. WUCHANG, CHINA

MARCH 1949

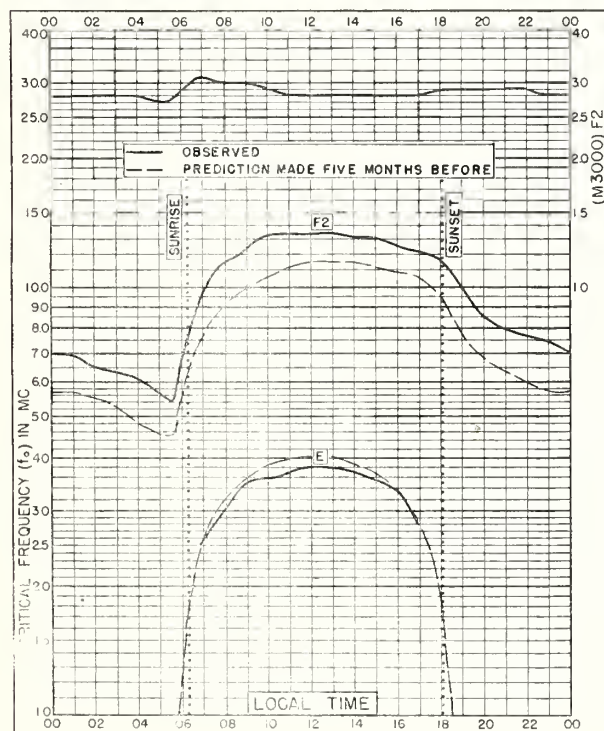


Fig. 11. BATON ROUGE, LOUISIANA  
30.5°N, 91.2°W

MARCH 1949

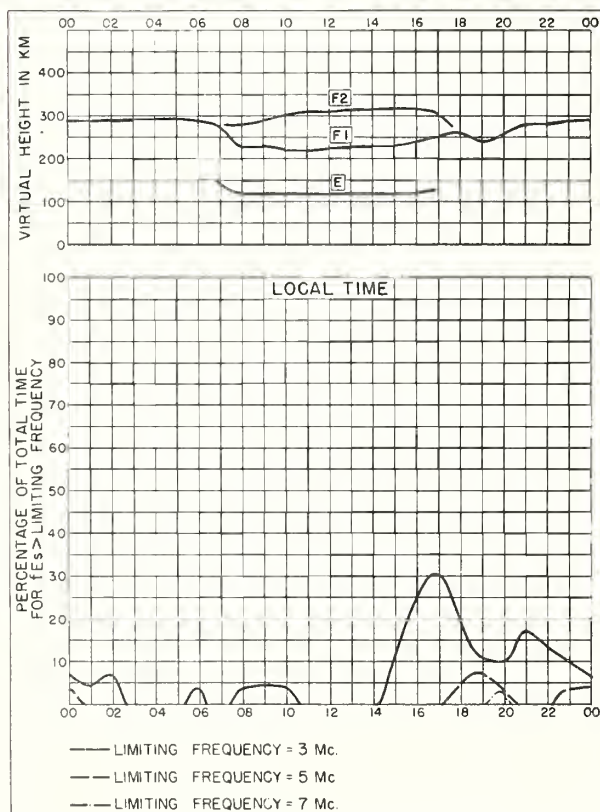


Fig. 12. BATON ROUGE, LOUISIANA

MARCH 1949

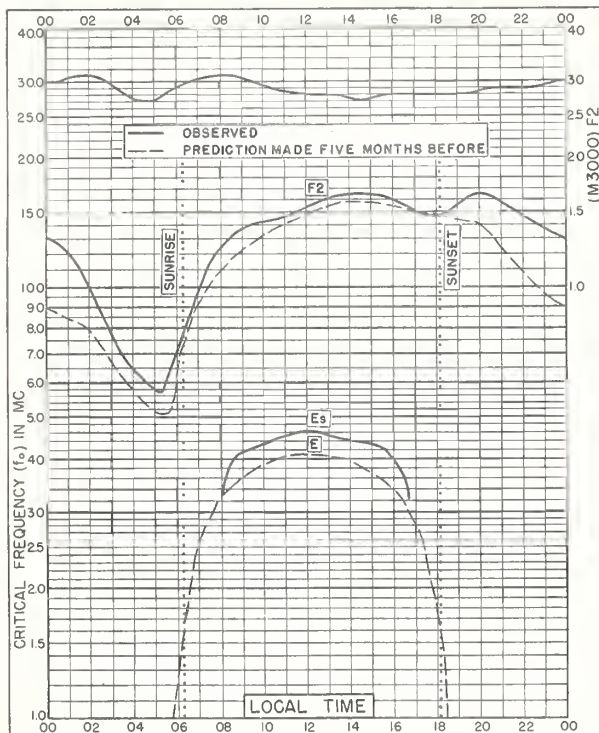


Fig. 13. OKINAWA I.  
26.3°N, 127.7°E

MARCH 1949

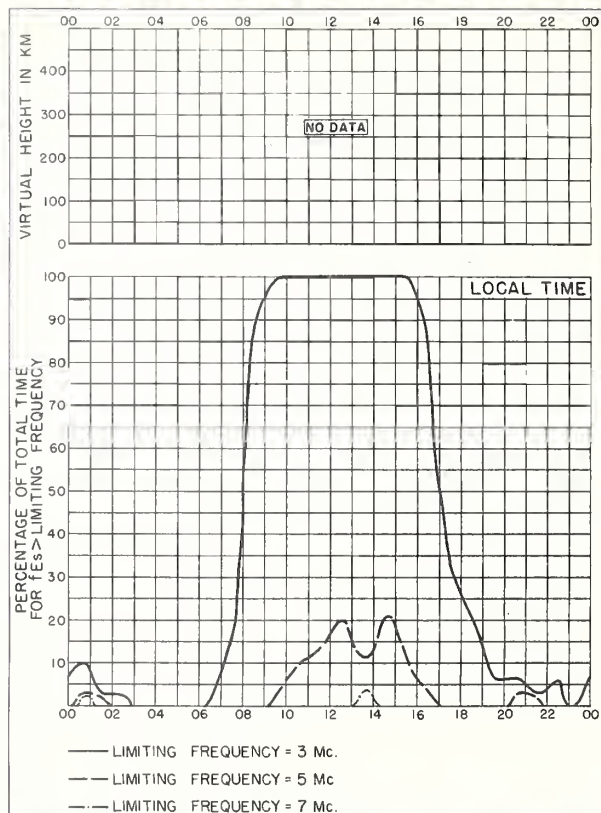


Fig. 14. OKINAWA I.

MARCH 1949

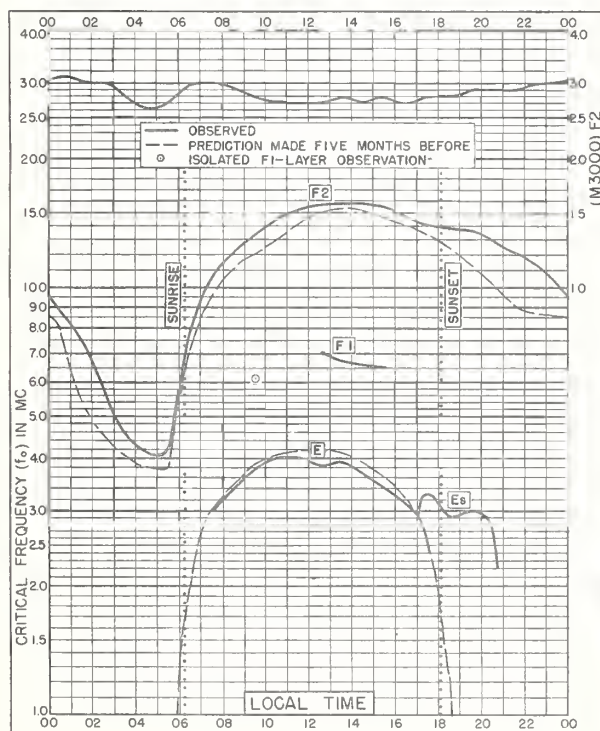


Fig. 15. MAUI, HAWAII  
20.8°N, 156.5°W

MARCH 1949

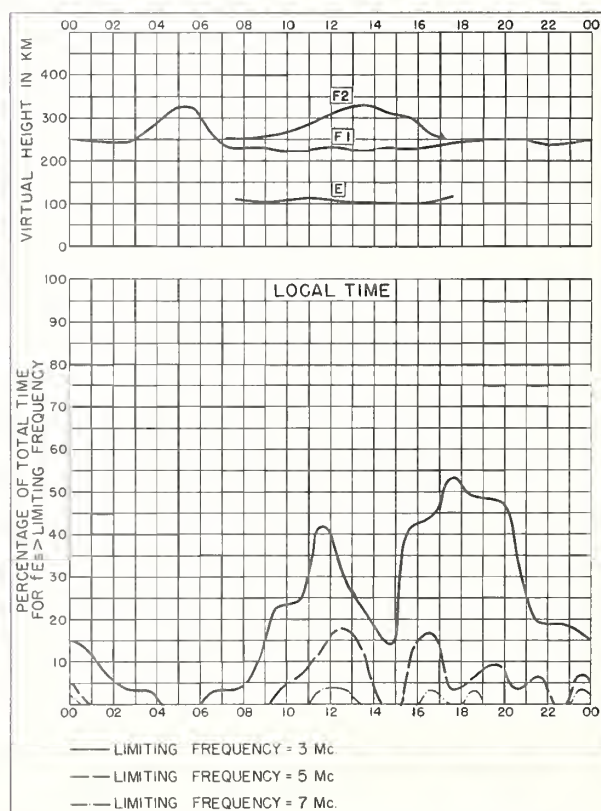


Fig. 16. MAUI, HAWAII

MARCH 1949

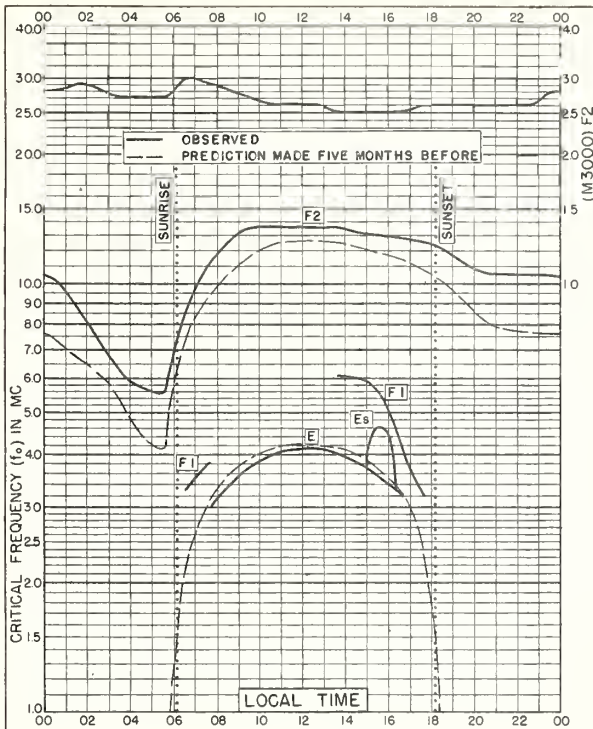


Fig. 17. SAN JUAN, PUERTO RICO  
18.4°N, 66.1°W

MARCH 1949

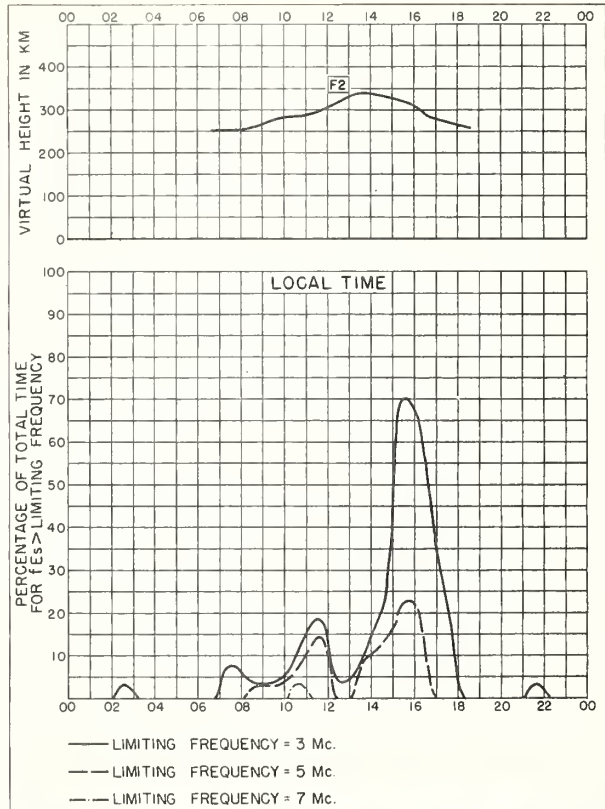


Fig. 18. SAN JUAN, PUERTO RICO

MARCH 1949

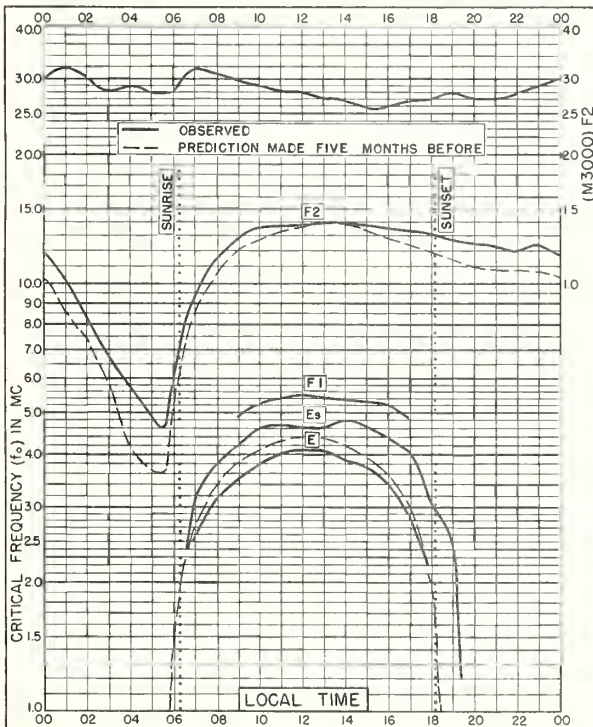


Fig. 19. TRINIDAD, BRIT. WEST INDIES  
10.6°N, 61.2°W

MARCH 1949

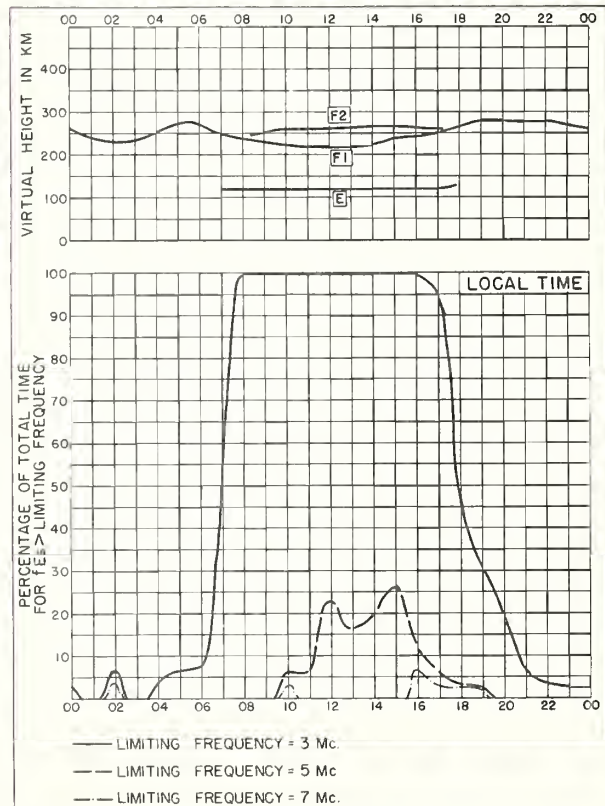
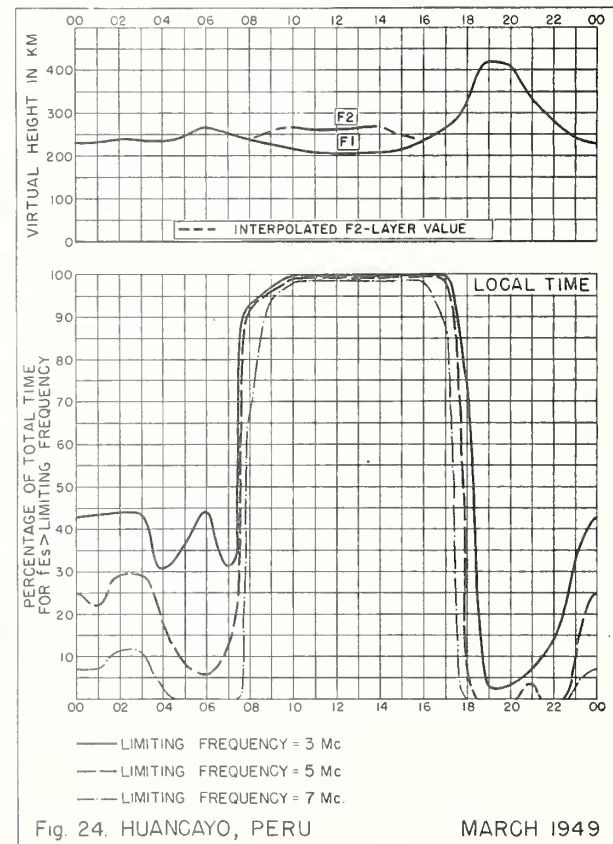
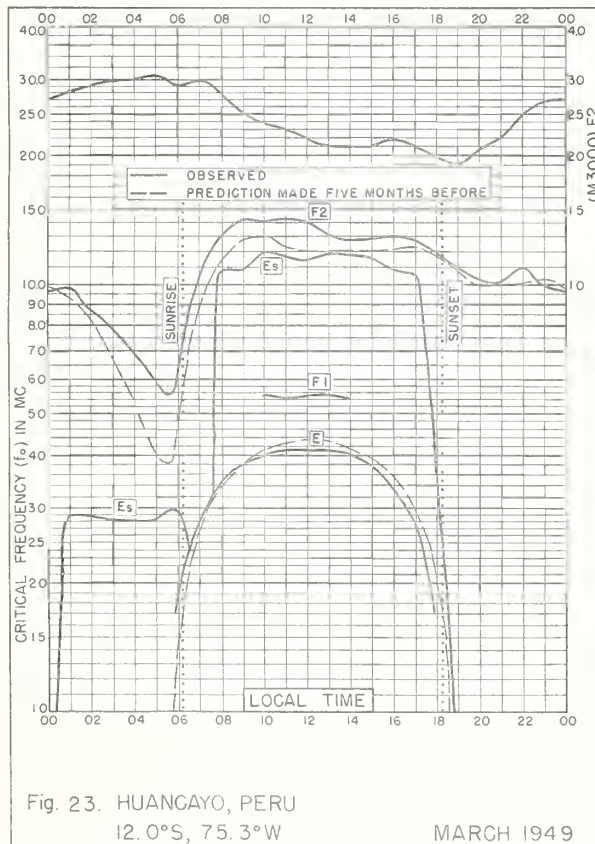
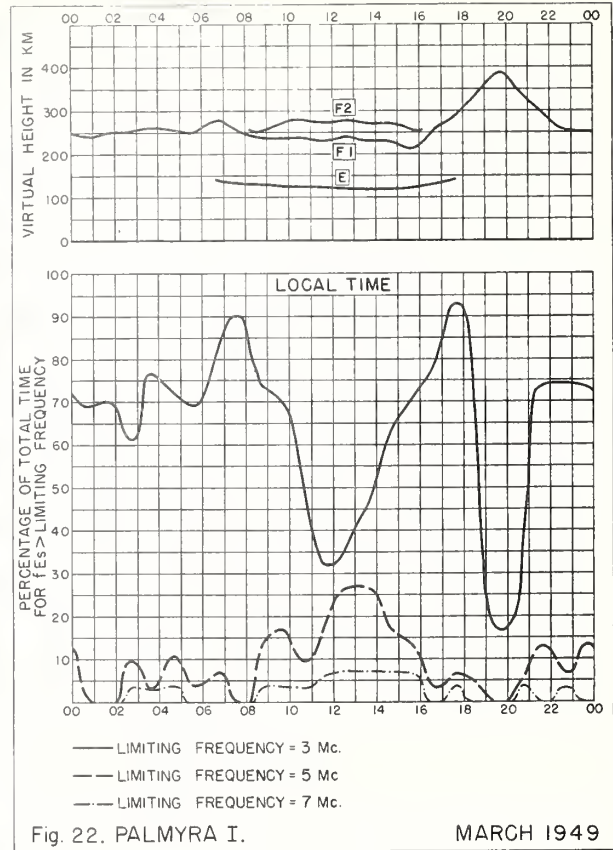
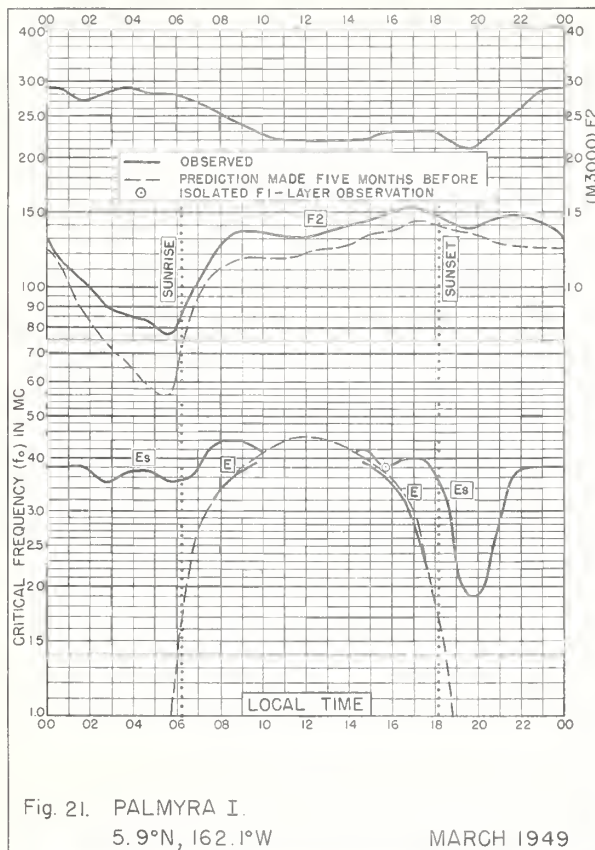


Fig. 20. TRINIDAD, BRIT. WEST INDIES

MARCH 1949



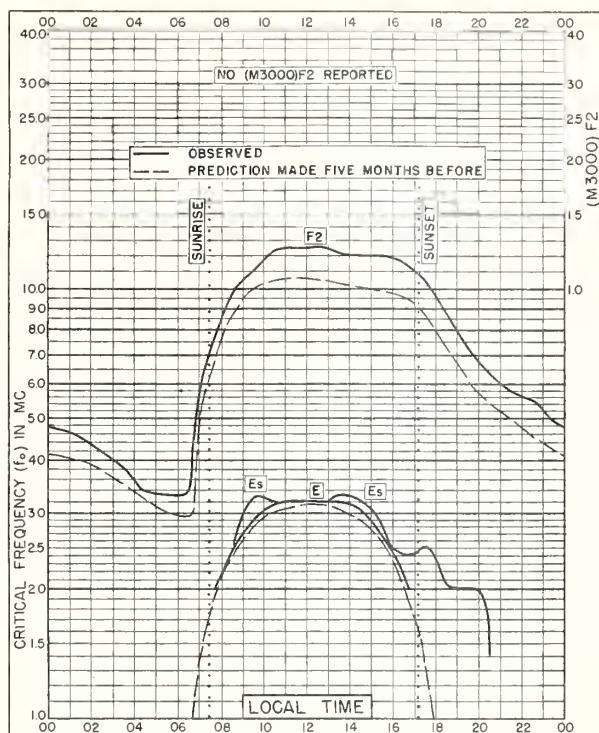


Fig. 25. LINDAU/HARZ, GERMANY  
51.6° N, 10.1° E FEBRUARY 1949

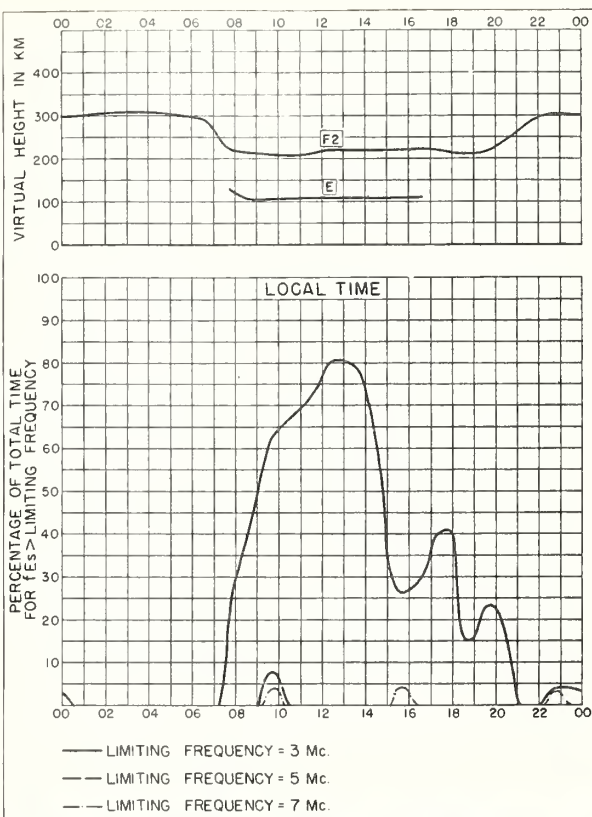


Fig. 26. LINDAU/HARZ, GERMANY FEBRUARY 1949

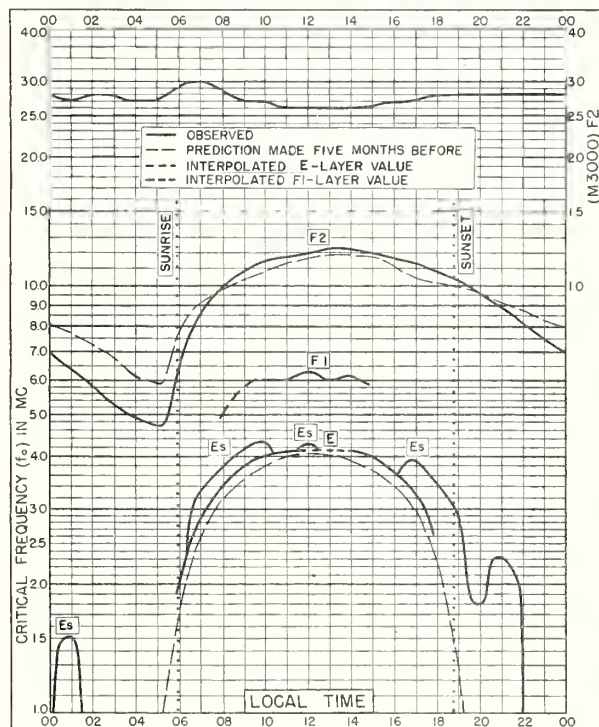


Fig. 27. JOHANNESBURG, U. OF S. AFRICA  
26.2° S, 28.0° E FEBRUARY 1949

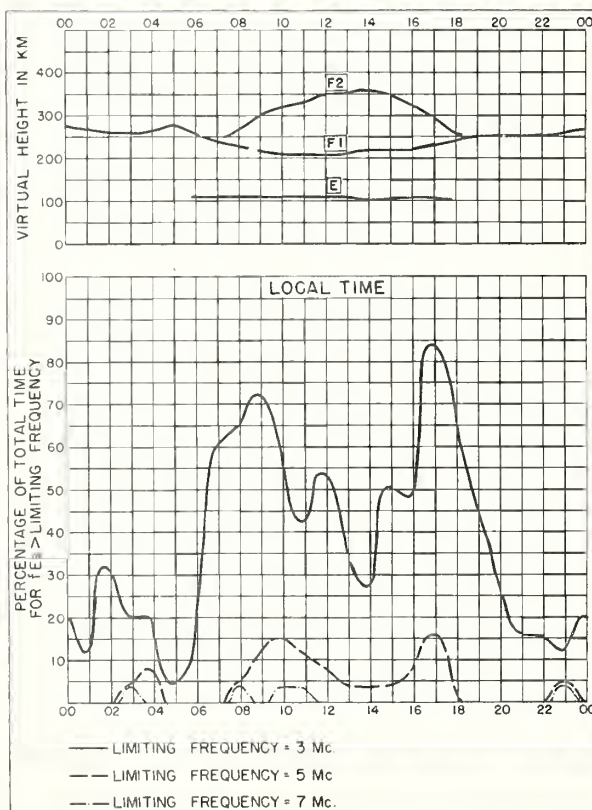


Fig. 28. JOHANNESBURG, U. OF S. AFRICA FEBRUARY 1949

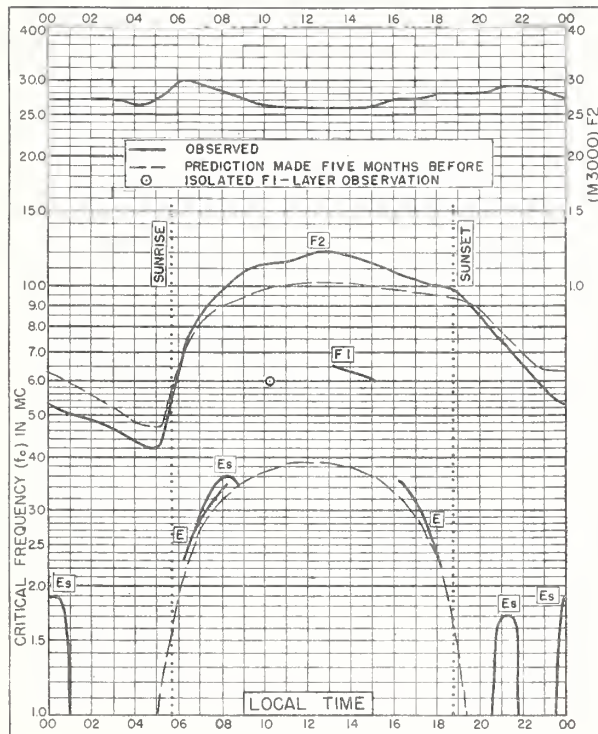


Fig. 29. CAPETOWN, U. OF S. AFRICA  
34.2°S, 18.3°E  
FEBRUARY 1949

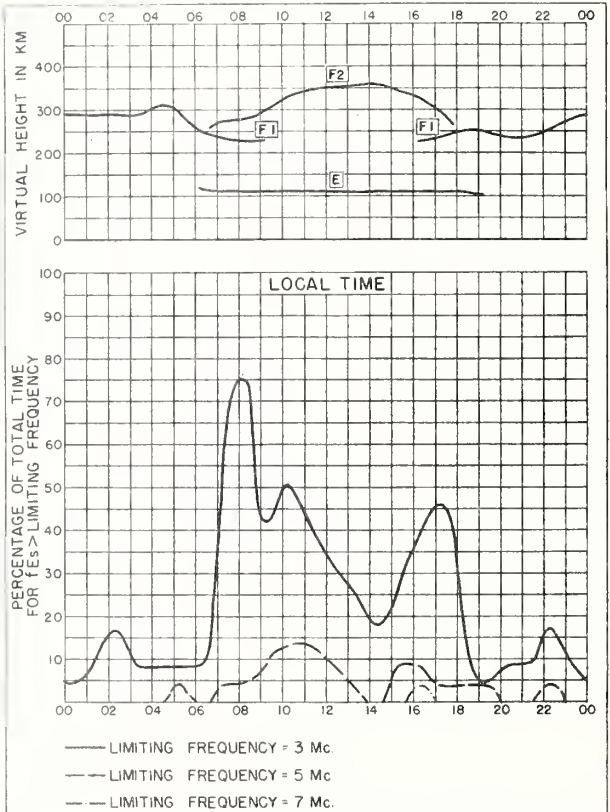


Fig. 30. CAPETOWN, U. OF S. AFRICA  
FEBRUARY 1949

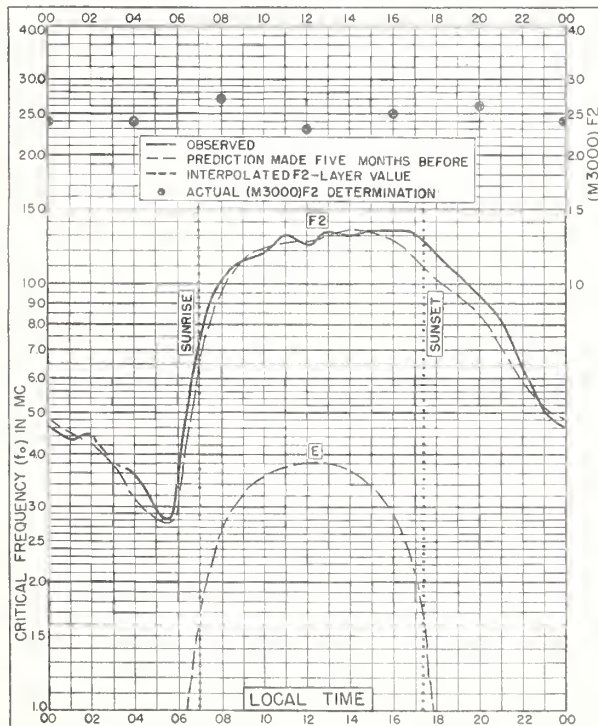


Fig. 31. DELHI, INDIA  
28.6°N, 77.1°E  
JANUARY 1949

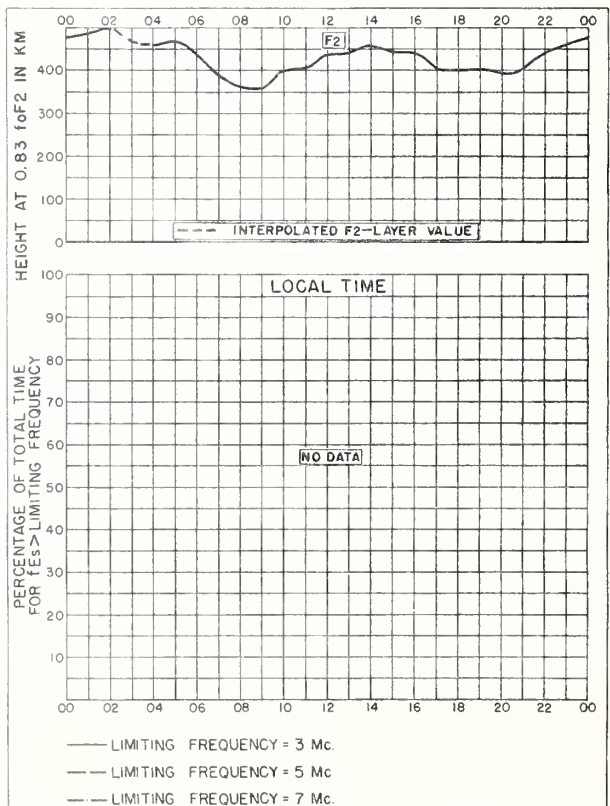


Fig. 32. DELHI, INDIA  
JANUARY 1949

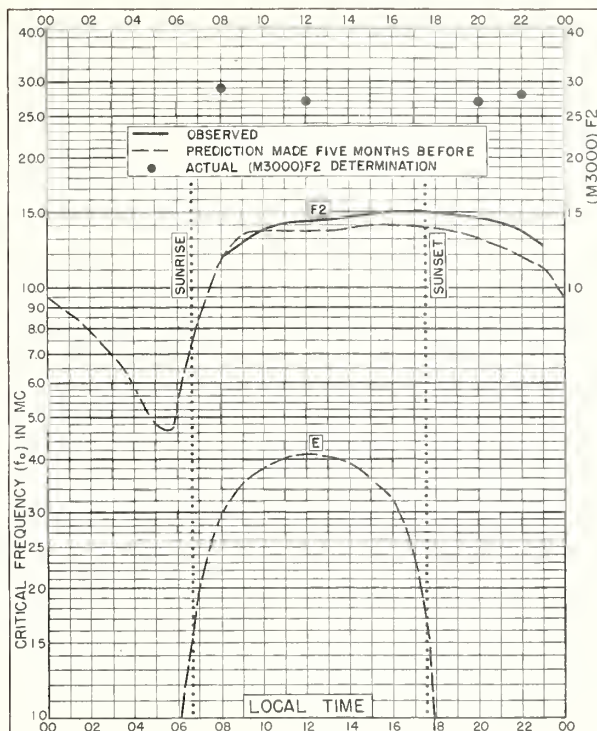


Fig. 33. BOMBAY, INDIA  
19.0°N, 73.0°E

JANUARY 1949

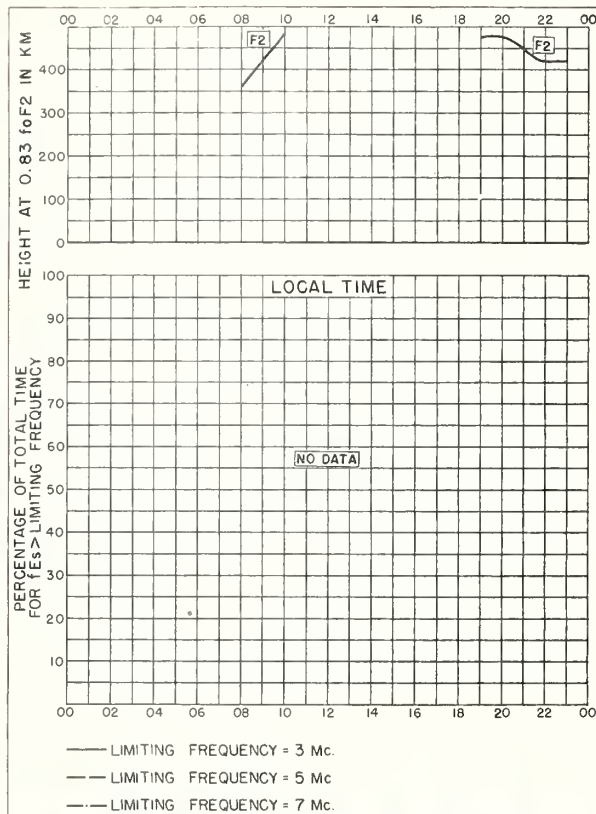


Fig 34. BOMBAY, INDIA

JANUARY 1949

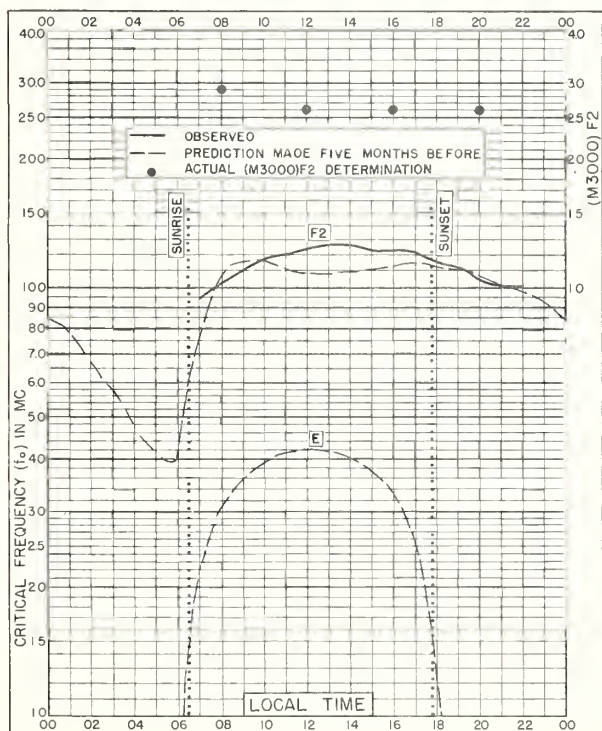


Fig 35. MADRAS, INDIA  
13.0°N, 80.2°E

JANUARY 1949

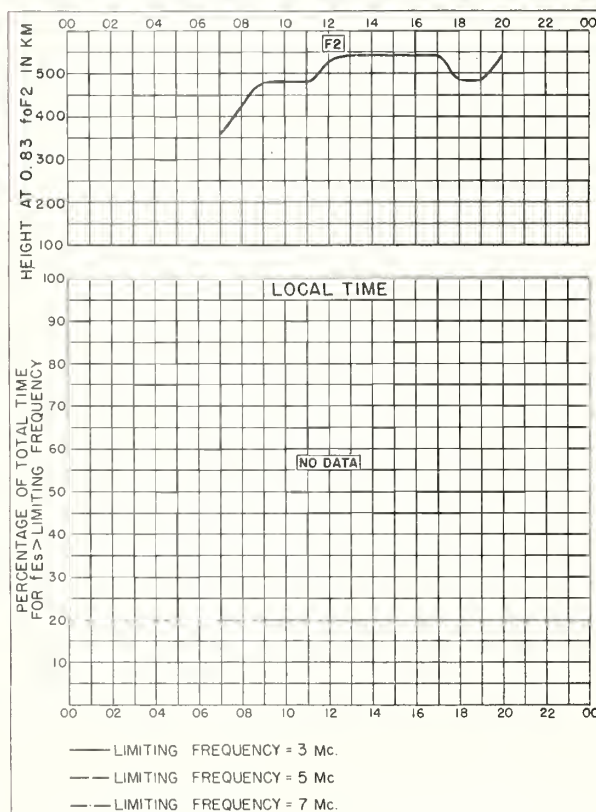


Fig 36. MADRAS, INDIA

JANUARY 1949

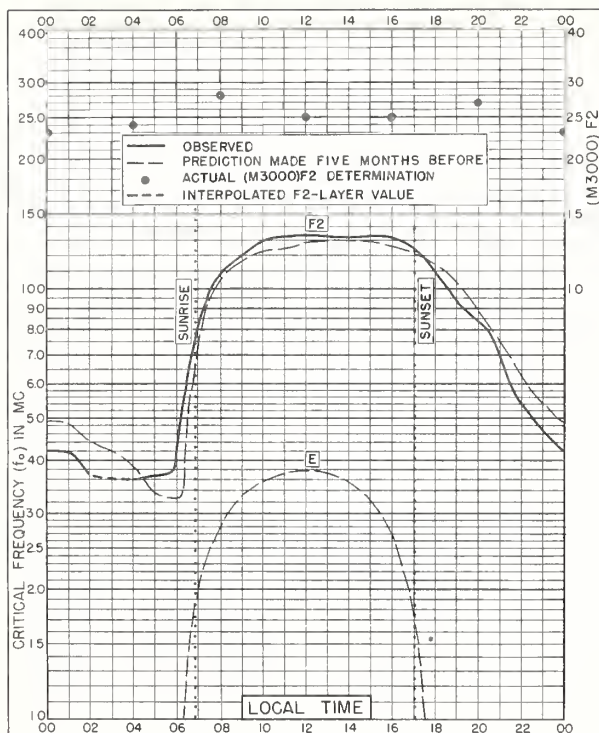


Fig. 37. DELHI, INDIA  
28.6°N, 77.1°E

DECEMBER 1948

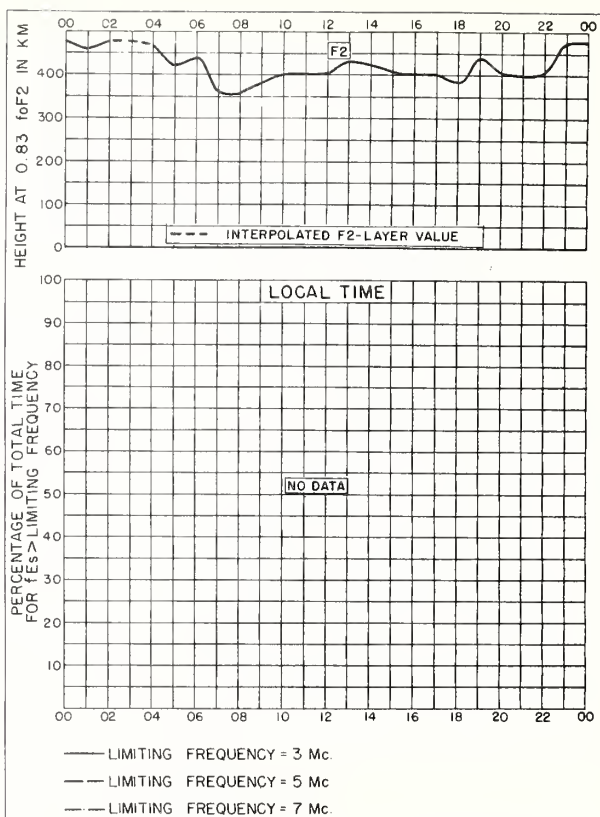


Fig. 38. DELHI, INDIA

DECEMBER 1948

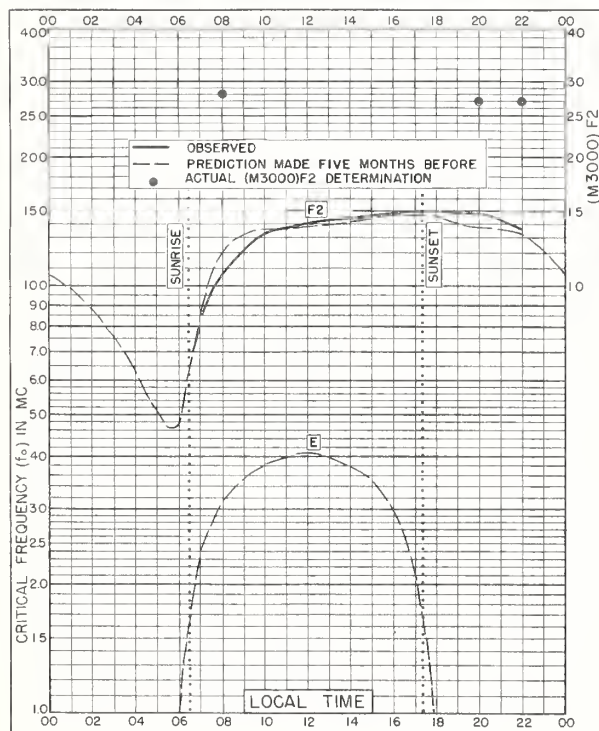


Fig. 39. BOMBAY, INDIA  
19.0°N, 73.0°E

DECEMBER 1948

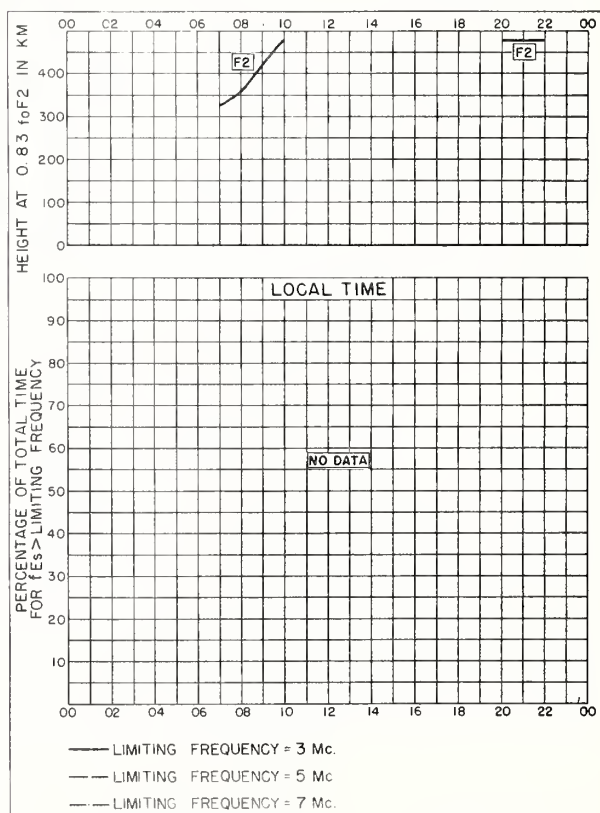
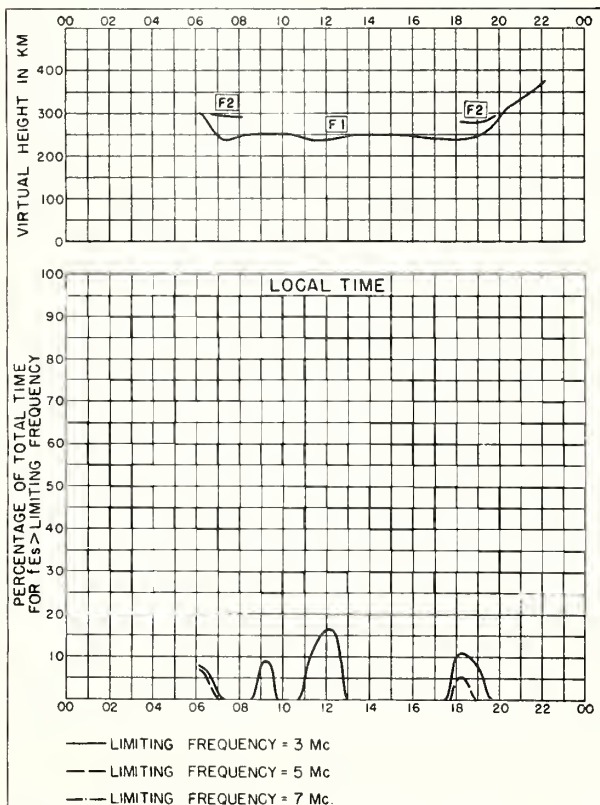
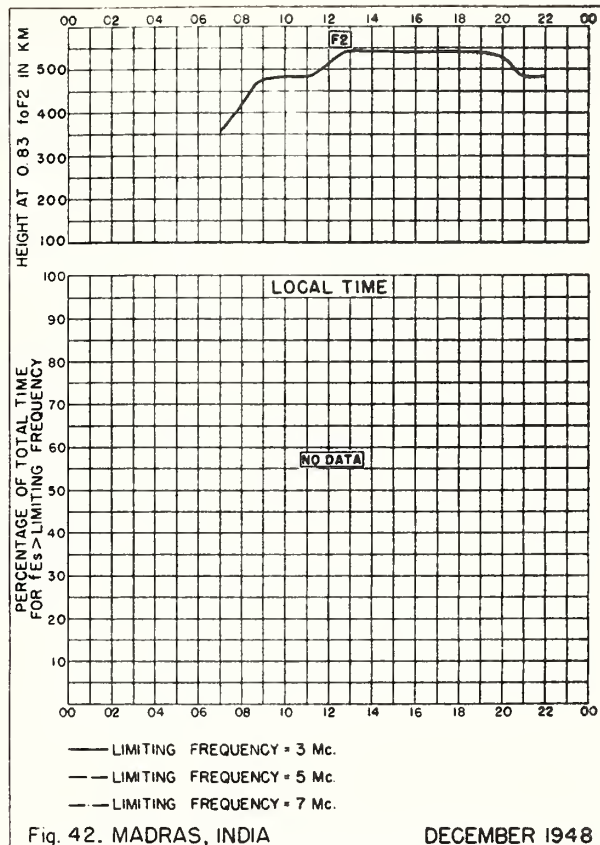
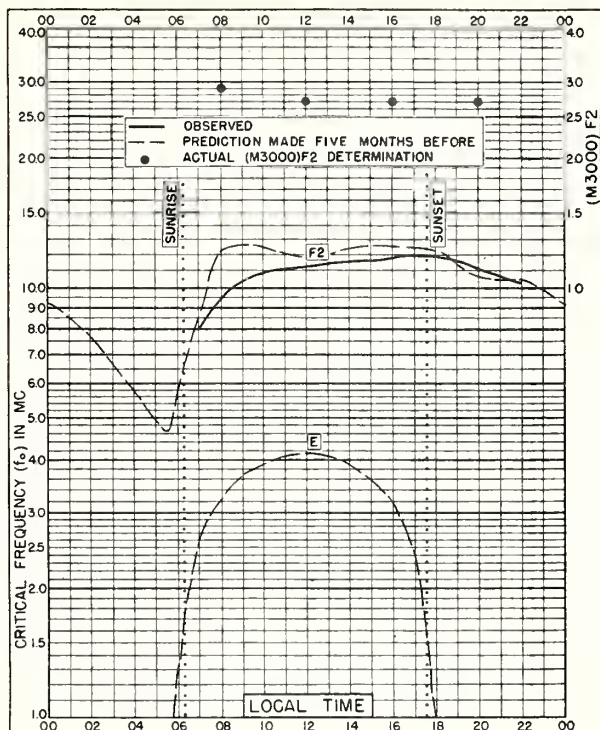


Fig. 40. BOMBAY, INDIA

DECEMBER 1948



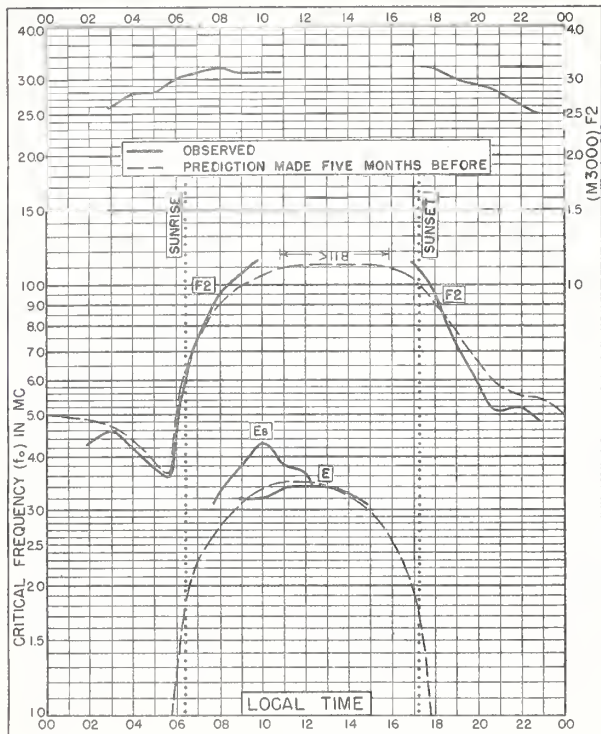


Fig 44. POITIERS, FRANCE  
46.6°N, 2.0°W

OCTOBER 1948

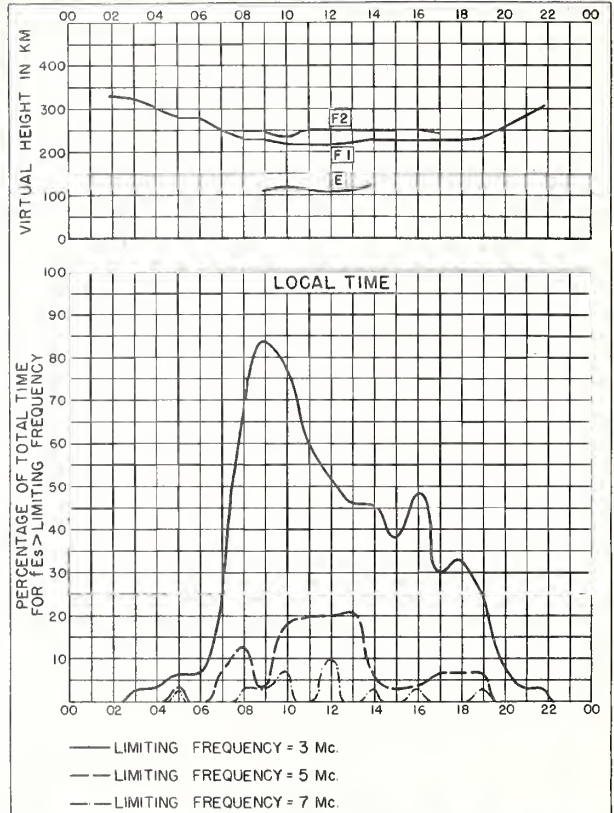


Fig 45. POITIERS, FRANCE

OCTOBER 1948

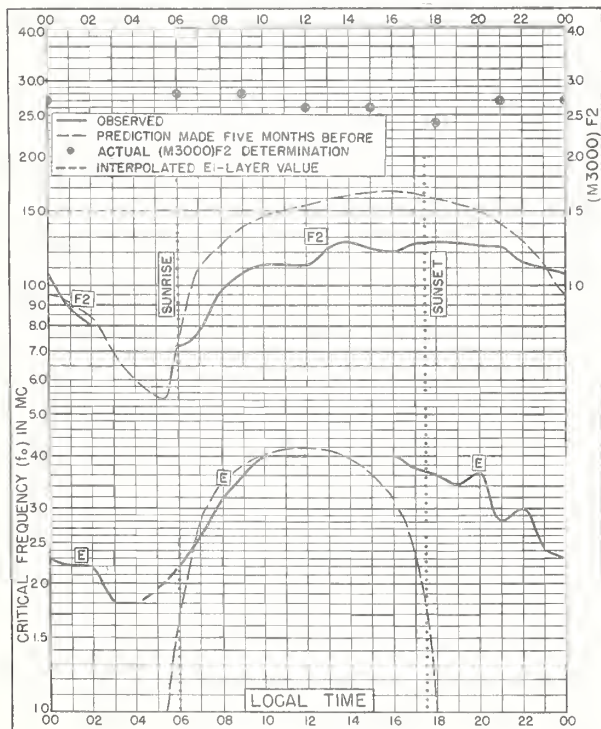


Fig 46. CALCUTTA, INDIA  
22.6°N, 88.4°E

OCTOBER 1948

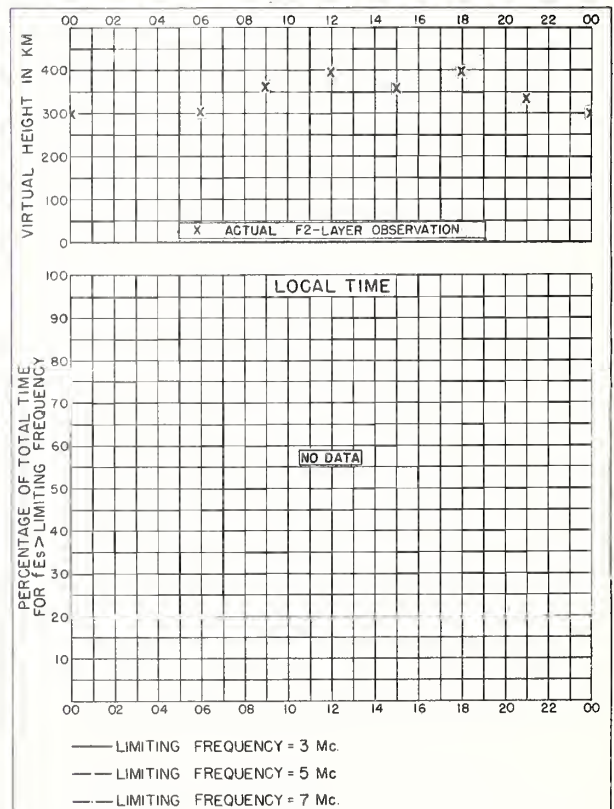
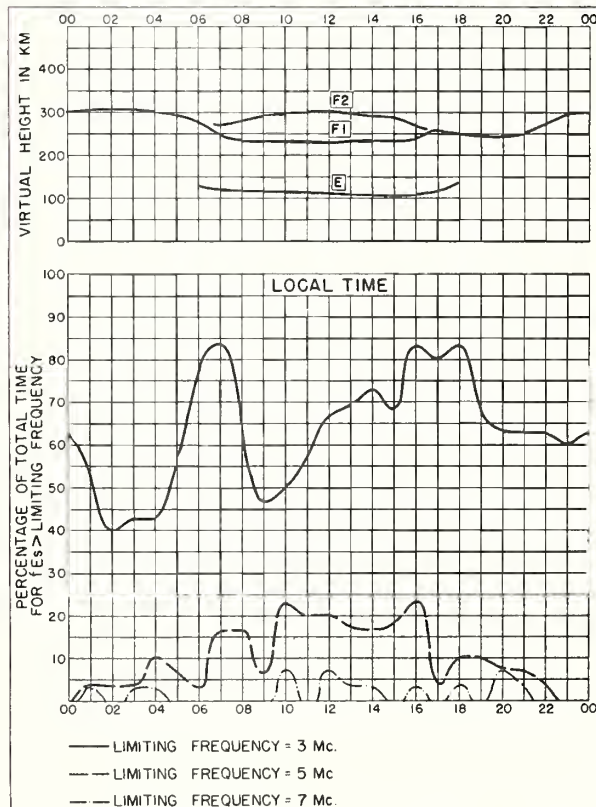
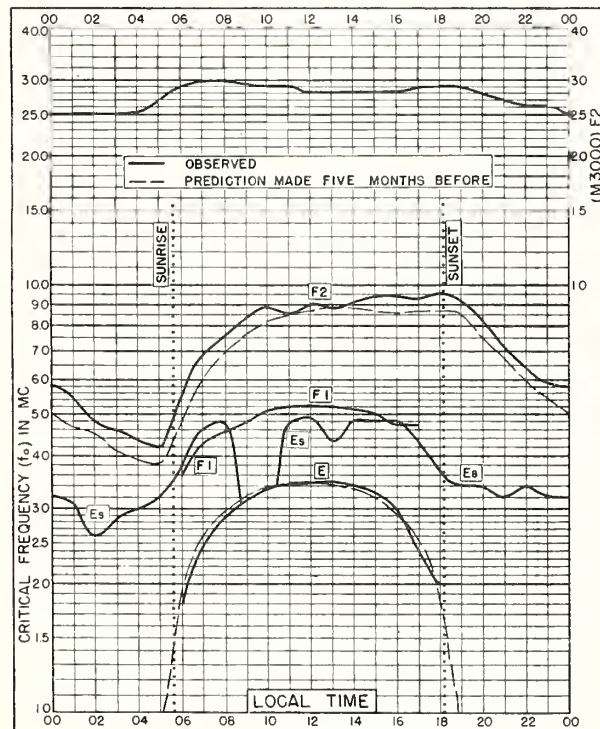
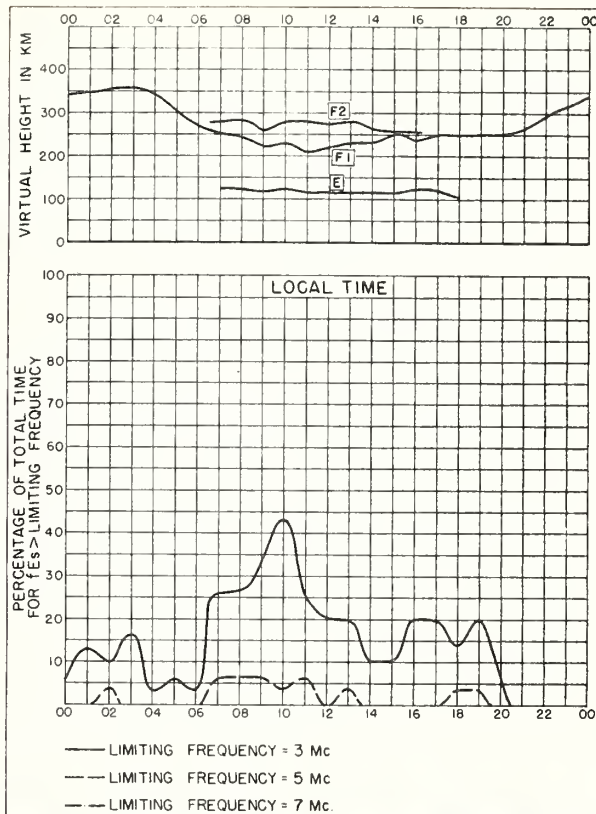
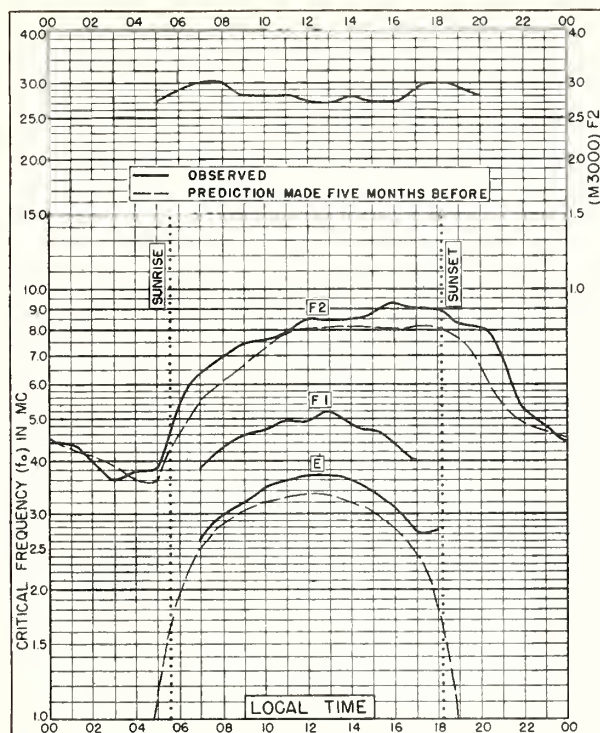


Fig 47. CALCUTTA, INDIA

OCTOBER 1948



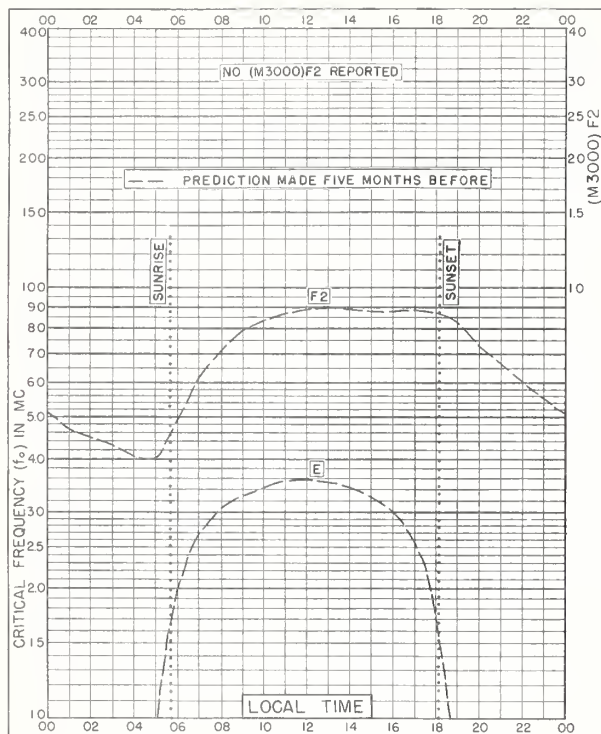


Fig. 52. BAGNEUX, FRANCE

48. 8°N, 2.3°E

SEPTEMBER 1948

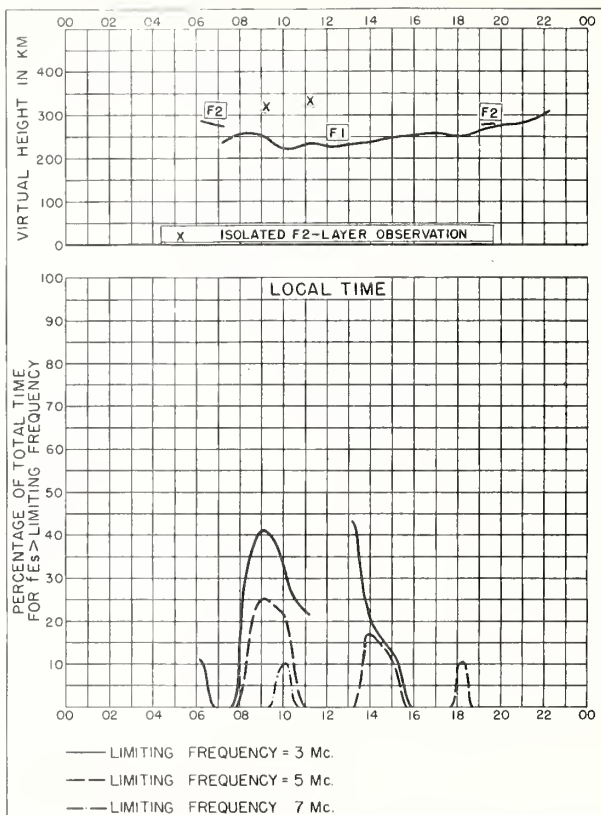


Fig. 53. BAGNEUX, FRANCE

SEPTEMBER 1948

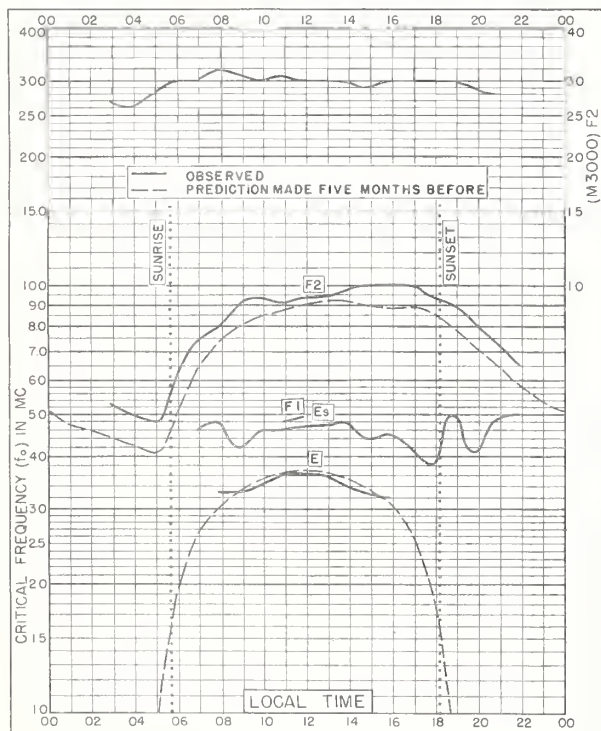


Fig. 54. POITIERS, FRANCE

46. 6°N, 2.0°W

SEPTEMBER 1948

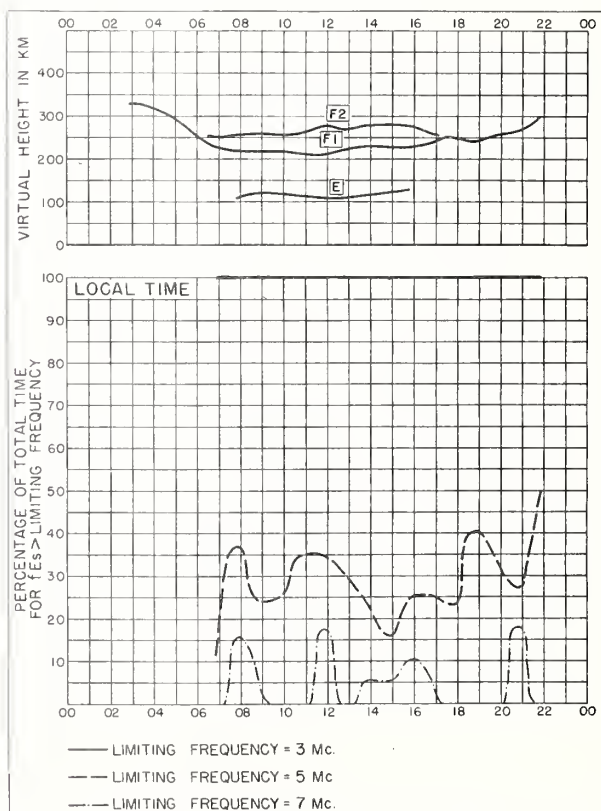


Fig. 55. POITIERS, FRANCE

SEPTEMBER 1948

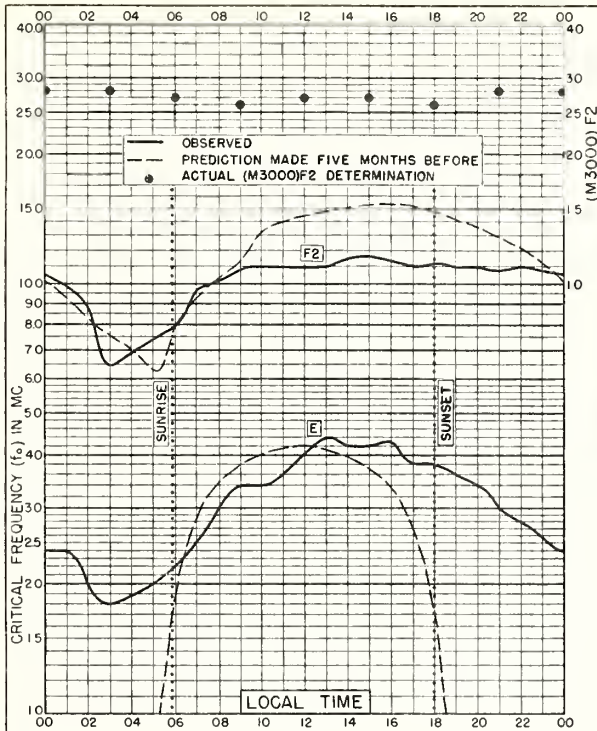


Fig. 56. CALCUTTA, INDIA  
22.6°N, 88.4°E

SEPTEMBER 1948

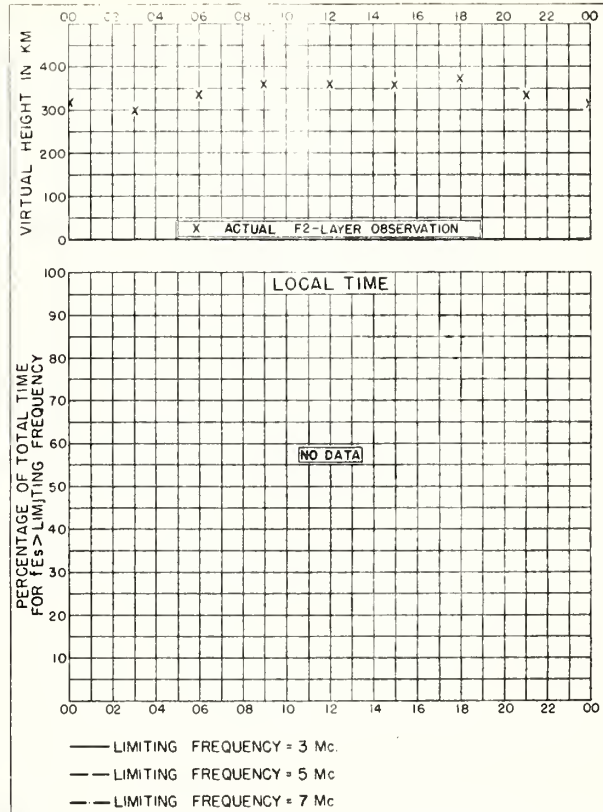


Fig. 57. CALCUTTA, INDIA

SEPTEMBER 1948

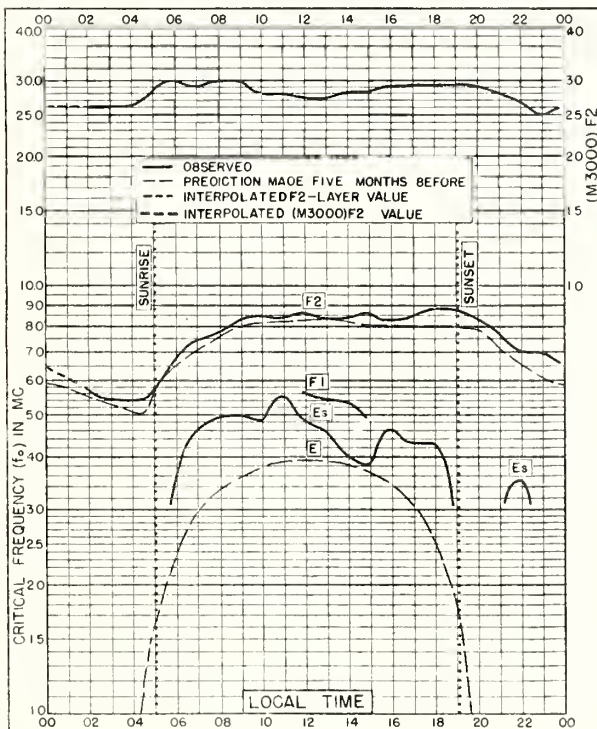


Fig. 58. POITIERS, FRANCE  
46.6°N, 2.0°W

AUGUST 1948

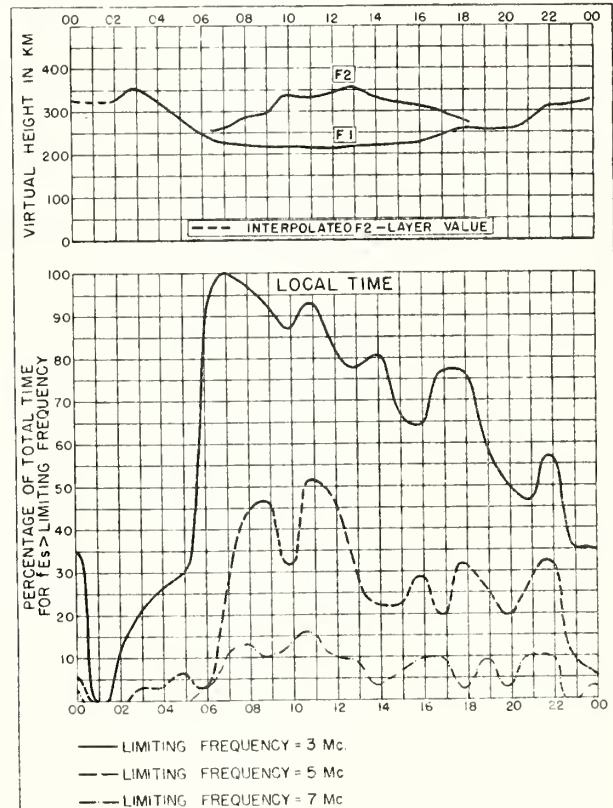
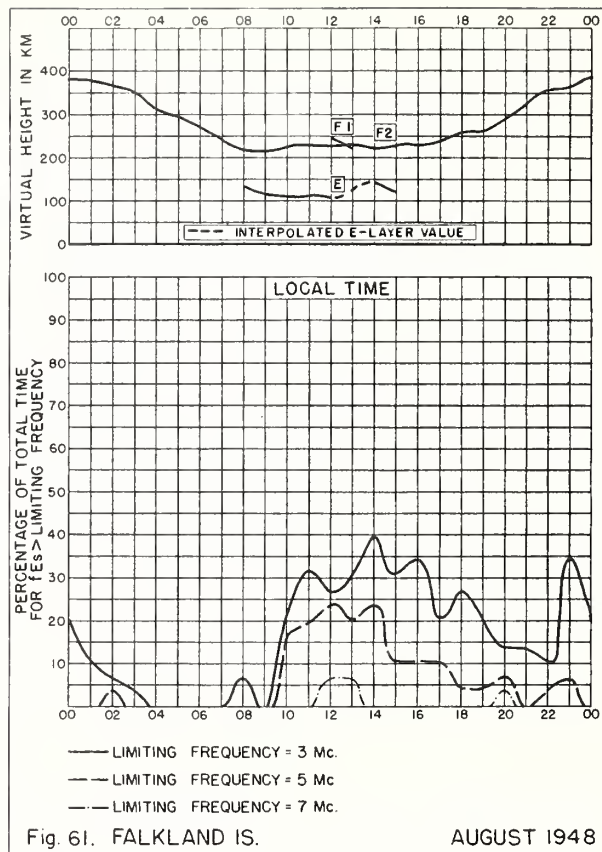
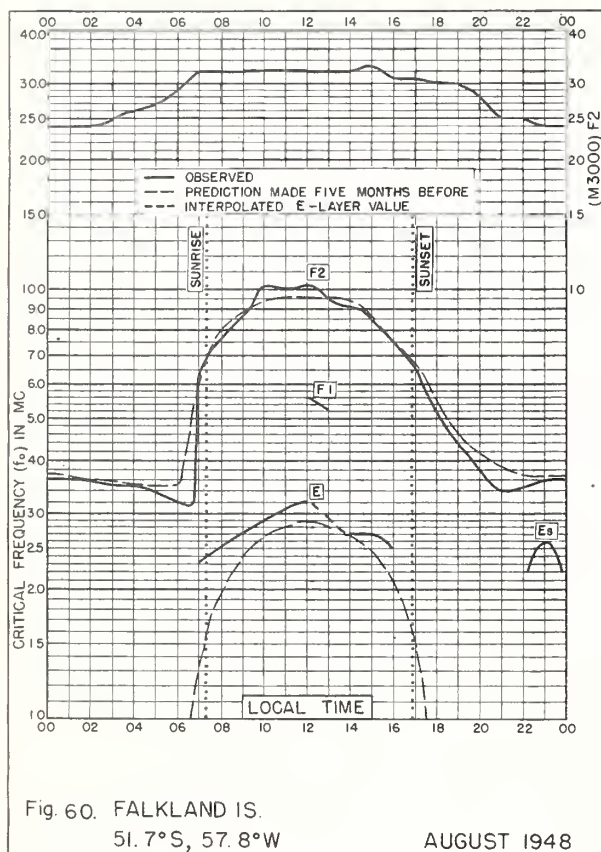


Fig. 59. POITIERS, FRANCE

AUGUST 1948



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# CRPL and IRPL Reports

[A list of CRPL Section Reports is available from the Central Radio Propagation Laboratory upon request]

## Daily:

Radio disturbance warnings, every half hour from broadcast station WWV of the National Bureau of Standards. Telephoned and telegraphed reports of ionospheric, solar, geomagnetic, and radio propagation data.

## Weekly:

CRPL-J. Radio Propagation Forecast (of days most likely to be disturbed during following month).

## Semimonthly:

CRPL-Ja. Semimonthly Frequency Revision Factors for CRPL Basic Radio Propagation Prediction Reports.

## Monthly:

CRPL-D. Basic Radio Propagation Predictions—Three months in advance. (Dept. of the Army, TB 11-499-, monthly supplements to TM 11-499; Dept. of the Navy, DNC-13-1 ( ), monthly supplements to DNC-13-1.)

CRPL-F. Ionospheric Data.

## Quarterly:

\*IRPL-A. Recommended Frequency Bands for Ships and Aircraft in the Atlantic and Pacific.

\*IRPL-H. Frequency Guide for Operating Personnel.

## Circulars of the National Bureau of Standards:

NBS Circular 462. Ionospheric Radio Propagation.

NBS Circular 465. Instructions for the Use of Basic Radio Propagation Predictions.

## Reports issued in past:

IRPL-C61. Report of the International Radio Propagation Conference, 17 April to 5 May 1944.

IRPL-G1 through G12. Correlation of D. F. Errors With Ionospheric Conditions.

IRPL-R. Nonscheduled reports:

R4. Methods Used by IRPL for the Prediction of Ionosphere Characteristics and Maximum Usable Frequencies.

R5. Criteria for Ionospheric Storminess.

R6. Experimental Studies of Ionospheric Propagation as Applied to the Loran System.

R7. Second Report on Experimental Studies of Ionospheric Propagation as Applied to the Loran System.

R9. An Automatic Instantaneous Indicator of Skip Distance and MUF.

R10. A Proposal for the Use of Rockets for the Study of the Ionosphere.

R11. A Nomographic Method for Both Prediction and Observation Correlation of Ionosphere Characteristics.

R12. Short Time Variations in Ionospheric Characteristics.

R14. A Graphical Method for Calculating Ground Reflection Coefficients.

R15. Predicted Limits for F2-layer Radio Transmission Throughout the Solar Cycle.

R16. Predicted F2-layer Frequencies Throughout the Solar Cycle, for Summer, Winter, and Equinox Season.

R17. Japanese Ionospheric Data—1943.

R18. Comparison of Geomagnetic Records and North Atlantic Radio Propagation Quality Figures—October 1943 Through May 1945.

R19. Nomographic Predictions of F2-layer Frequencies Throughout the Solar Cycle, for June.

R20. Nomographic Predictions of F2-layer Frequencies Throughout the Solar Cycle, for September.

R21. Notes on the Preparation of Skip-Distance and MUF Charts for Use by Direction-Finder Stations. (For distances out to 4000 km.)

R22. Nomographic Predictions of F2-layer Frequencies Throughout the Solar Cycle, for December.

R23. Solar-Cycle Data for Correlation with Radio Propagation Phenomena.

R24. Relations Between Band Width, Pulse Shape and Usefulness of Pulses in the Loran System.

R25. The Prediction of Solar Activity as a Basis for the Prediction of Radio Propagation Phenomena.

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R27. Relationships Between Radio Propagation Disturbance and Central Meridian Passage of Sunspots Grouped by Distance From Center of Disc.

R28. Nomographic Predictions of F2-layer Frequencies Throughout the Solar Cycle, for January.

R30. Disturbance Rating in Values of IRPL Quality-Figure Scale from A. T. & T. Co. Transmission Disturbance Reports to Replace T. D. Figures as Reported.

R31. North Atlantic Radio Propagation Disturbances, October 1943 Through October 1945.

R32. Nomographic Predictions of F2-layer Frequencies Throughout the Solar Cycle, for February.

R33. Ionospheric Data on File at IRPL.

R34. The Interpretation of Recorded Values of  $fE_s$ .

R35. Comparison of Percentage of Total Time of Second-Multiple  $E_s$  Reflections and That of  $fE_s$  in Excess of 3 Mc.

IRPL-T. Reports on tropospheric propagation:

T1. Radar operation and weather. (Superseded by JANP 101.)

T2. Radar coverage and weather. (Superseded by JANP 102.)

CRPL-T3. Tropospheric Propagation and Radio-Meteorology. (Reissue of Columbia Wave Propagation Group WPG-5.)

\*Items bearing this symbol are distributed only by U. S. Navy. They are issued under one cover as the DNC-14 series.

